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Modularity: The solution for green tradeshow exhibit designs

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Modularity: The solution for green tradeshow exhibit designs

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ABSTRACT

Modular tradeshow exhibit design systems were originally designed as an economical solution and were marketed for their features such as easy shipping and handling, easy set-up and a potential for reconfiguration of the components. This potential for reconfiguration is underutilized in the current modular systems, due to difficulty in understanding how to use and re-use the system components. Though modularity is considered as a sustainable measure in allied fields of architecture, industrial design etc, in the tradeshow design field the topic of the sustainable or "green" design seem to be limited to material selection, recycling or conserving energy. This study tries to make modular exhibit systems easier to use and reconfigure the components into a variety of different exhibits. This ability for reconfiguration– a material resource reduction feature– can be better understood as a sustainable choice in tradeshow exhibits. This study accomplishes this through the design of modular kits formed of components from the Lacet System (now a defunct modular system) and the design of multiple exhibit prototypes reconfigured from each kit.

CHAPTER 1. INTRODUCTION

Modular exhibit systems are an important part of the tradeshow exhibit industry. Modular exhibit systems are a collection of standard units or components that have the potential to be combined and re-arranged to form many different exhibits. The standard units, based on the designs conceived using the system, are mantled at the tradeshow site and dismantled again for easy handling, storage and shipping. The dismantled pieces are packed compactly in easy to handle boxes specially designed for the modular exhibit systems. These numerable features make modular exhibit systems indispensible to the tradeshows.

Modular tradeshow exhibit systems were introduced in the early 1970's in the market, making a quick and substantial impact in the business, especially for smaller exhibitor companies who could not invest in custom exhibits. The modular tradeshow exhibit systems provided the companies with cost effective, interesting structures that were also logistically viable and durable. Like all systems they required some time to get familiarized with. Simplest way around this was to misuse them as just hangers for graphic display. Pop –ups displays were providing the same function and were lot less cheap. For the exhibitors who wanted a more elaborate and distinctive look went for custom exhibits, which were fabricated as per design. Both pop-ups and custom designed exhibits did not need any time being familiarized and were preferred by exhibitors over modular exhibit systems. Soon they were labeled 'stale' and lost their reputation to produce interesting exhibit structures for tradeshows. The main focus of this study is to counter the reasons tradeshow systems are underutilized in tradeshow exhibit design and reintroduce modularity as a system that can provide interesting structure.

The secondary focus of this study/research is to try and link the modular approach with today's need for sustainable designs. Energy consumed and Environmental impact faced due to shipping, construction, display and wastage of exhibits are very high. The tradeshow industry is trying to break away from its image of being a wasteful industry by adopting greener practices. This sustainable approach lends itself to all aspects of tradeshows including the exhibit designs. This consciousness has led to reusing, recycling and innovation of materials that are being used in the exhibits. While newer, greener modular exhibit design materials are being introduced, none of them focus heavily on the reusable feature of the modular exhibits. Being long overlooked because of their assumed inadequacy to produce multiple interesting exhibit structures, the modular systems are isolated from the new approaches for sustainability. If the study is successful to reintroduce the modular exhibit systems to provide interesting structure it would:

1. Lend modular exhibit systems as a sustainable concept in itself
2. Help find a solution for an affordable, sustainable and interesting modular exhibit design system

The concept of modularity is often used in the fields of mathematics, science, engineering, art and architecture. Modularity as per the Webster's dictionary is-

"Constructed with standardized units or dimensions for flexibility and variety in use."

In the field of graphic design there are many intriguing possibilities that could be conjured up by the modular systems. The duality of modular systems- to be simple in a module and complicated in many- is an exciting notion for any inventive mind. But this duality is often missed in the modular exhibit systems wherein the aspect of "*flexibility and variety in use"* is not fully utilized, often hindering the use of modular exhibit systems. It was

this missing link that led towards the investigation of modular exhibit design as the subject of this study.

Tradeshows or trade fairs have been around for centuries. The history of trade fair and the concept of exhibit started from 1000B.C. where trading goods were exhibited and sold to the public (Roth, 139). In recent times, the tradeshow exhibit industry has taken on the role of communication between the traders and the viewers. The purpose of a tradeshow varies depending on the need of the time and the extent of technology of the time. A tradeshow is used as a marketing tool or a place of sale for companies, industries, different trades or services. This can be at local, regional national or international levels and can address a select audience or be open to the public. Essentially,a tradeshow is an exhibition that allows different trades/companies of a related industry to showcase and demonstrate their services/products. Almost every industry or trade has one or more tradeshows of their own.

Exhibit design industry is budget driven; exhibit design is one part of the entire tradeshow practice. Depending on the scale of the tradeshow the companies that participate choose to present themselves with either a stall or a booth. The scale of the booth varies as per the scale of the tradeshow in general and more importantly on the company's capacity to pay for a given space. The different categories of trade show exhibit design are based on their size and function: Small Exhibit, Medium Exhibits, Large exhibits, Floor exhibits, Demonstration Exhibits, and Free standing exhibits.

In a regular tradeshow almost two-thirds of the companies occupy the small exhibit space ranging from 10X10 feet to 10X20 feet. The companies that generally use this space are small to mid-size companies that do not necessarily have huge budgets to invest in a

complete custom exhibit or the companies that feel a particular tradeshow is not their major market. The modular exhibit systems fit perfectly in this niche providing economical and possibility to create numerous different designs from the same system. Re-using the same modular system for so many different exhibit designs not only reduces costs but also reduces the environmental impact and wastage associated with repeated construction of these exhibits. However the re-usable feature of the modular exhibit systems is not realized to its full potential mainly because of the misconceptions associated with it, which is indicative of the lack of clarity in showcasing their capability. The hypothesis thus created for this study is:

1. If showcased in a simple and easy to understand manner, a kit of modular exhibit design components could be designed to create a variety of exhibits that look significantly different without becoming boring.
2. This “reusability” of components in modular exhibit systems could lend itself to improve the sustainable features of the exhibits.

The following chapters closely study the relevant literature in Exhibit Design. This study demonstrates the variety of a kit of parts (modular exhibit design components), to achieve to goals- first its ability to produce many “custom” exhibits and second to be sustainable. This is put to test by building scaled modular components and then constructing exhibits using these components in a given exhibit space.

CHAPTER 2. LITERATURE REVIEW

2.1 What are exhibits?

There is a broad understanding of what exhibition means to different people. It can be categorized into the likes of art and painting exhibitions for the general public to more professional exhibition or marketing jargons like expositions, shows, displays, fairs (Velarde 13). Just like many other creative professions, the roots of exhibit design originated from the need for better communication of messages in the exhibition spaces whether for informative or promotional purposes.This again indicates the broad meaning associated to exhibition design as well as the niche that combines space and design.

Many types of exhibit design fit the role of designing environments for the purposes of communication. In their book *What is Exhibition Design?* Lorenc, Skolnick and Berger write,

> "From museum exhibitions, retail spaces and trade shows to themed entertainments, information kiosks, visitor centers, World 's Fairs, and expositions, exhibition design involves itself in creating experiences in real time, utilizing space, movement, and memory to facilitate multilayered communication. In whatever type of venue or situation their skills are engaged, exhibition designers work in multidisciplinary teams with their clients to help them tell their stories to their desired audience. They physically shape the experience, often acting in the role of composer, orchestrator, choreographer, and conductor, to ensure that the intended messages are delivered in the most compelling and meaningful way. They harness the powerful interpretive potential of space to deliver narratives to human beings, who are "hardwired" to receive messages through this medium. Melding communication design and

> the built environment, exhibition design createsenvironments that communicate." (Lorenc, Skolnick and Berger 8)

These "environments that communicate" could either be communicating information or could be used for commercial purpose. This review of literature focuses on commercial exhibits. These have evolved into events that are highly trade specific such as tradeshows, trade fairs, expositions etc. The selling and buying are done between salespeople and salespeople, between wholesalers and manufacturers or retailers. Exhibitors and the visitors are very aware of what they need and to what specifications. Some commercial exhibitions are open to the public though they take on a more market or fair sort of an appeal than those aimed at trade professionals.

The information required in exhibits can include pictures, diagrams and displays. Museums, science centers, heritage centers etc are the most common type of exhibitions that are information oriented. There purpose is to convey information. This changes quite a bit when information is added on commercial exhibits. In commercial exhibits, the entire design of the exhibit depends on the place available and how the visitor interactions are going to affect the over design and space of the exhibit. "Displaying to sell; displaying to delight; displaying to persuade- all perhaps achieving enlightenment, too- deal with the same basic commodity: three dimensional, informative space. (Velarde 13-37)

2.2 Tradeshow History

Early trade shows date back a long time. Early trade shows were regarded as 'markets'. Merchants gathered to such a market to trade their goods, their products or

produce to sell or barter. People visited these places to buy or sell the goods, and it became a place to socialize.

> “There have always been "trade shows," though certainly they weren't called that. They were regarded as forms of "the market." Indeed, "market day" is still prevalent throughout Europe and elsewhere in the world. The Bible tells of exhibitions staged to show off the wealth of kings. Merchants would bring their wares to display, sell, and barter, while visitors came to socialize and to shop. Trade fairs, the near relatives of trade shows, grew up around religious pilgrimages, whose weary travelers gathered in courtyards near churches or camps. The book of Ezekiel contains a vivid description of such a trade fair. And the book of Esther recounts the story of a king who staged a six-month long festival for his subjects. It's not difficult to imagine the colorful dress of these merchants-the "exhibitors"- and the exotic displays of goods. There was food, jewelry, clothing, and fragrant incense and oils” (Robbe, 10)

These small market places grew to the modern concept to gather under one “tent”- under one roof- to form trade show or expositions. The Great Exhibition of 1851at Crystal Palace, London, was set up in iron, glass and wood construction where products of the commonwealth was one such exhibition (Robbe, 11). Beginning of specialization of exhibition can be traced back to the exhibition held in London by the Society of Arts in 1847 was the first of the first exhibitions related solely with industrial design.

> “ It was, however, not until the end of the nineteenth century that exhibitions began to have anything like a profound and enduring effect on the character and standard of design, but then began a series of small exhibitions, the influence of which was out of all proportion to their size, because they reached the most knowledgeable and sensitive people. The first of these exhibitions were those of the Arts & Crafts Exhibition Society, a body that was founded

> through the influence of William Morris and began to hold exhibitions of craftwork and painting as early as 1888. But the most influential were the exhibitions of the *Deutsche Werkbund,* a group of architects, designers and industrialists under the leadership of Gropius, *who* held their first exhibition at Cologne in 1914 and after the first World war exhibited at Breslau in 1929 and 1930. A glance at an illustrated catalogue of the 1914 exhibition will show that many of the exhibits displayed there so long ago could be exhibited today as superb examples of the best contemporary style" (Luckhurst, 173).

From there on the exhibitions started becoming more specialized. The tone of trade specific exhibition was set withInternational Convention of 1928, in Paris; "that defined 'special' exhibition as those restricted to one applied science, one industry, one raw material or one elementary necessity" (Luckhurst, 172).

With the development of roadways and automobiles (after 1950), door-to door selling, travelling or sales man marketing boosted revenue and expanded customer and product reach. But the limited extent to which a single salesman could visit, sell and carry the product proved ineffective. It is during this time that the concept of hotel-room displays formed, where clients could come to the salesman. These proved moreadvantageous as more products and salesmen could set up products for an extended period of time at lower costs, more visitors could be serviced in a single day, the client's work day was not interrupted, and competitors could display near one other for the advantage of allowing clients to compare the products. This hotel room display grew tremendously, and grew more trade specific. These shows began being categorized as per the type of visitors-Consumer Shows and Industry Shows. The consumer shows are shows that are open to the general public and the exhibitors directly sell their products to them and the industry shows are open to companies or

individuals who deal in the trade of a specific industry. The industrial show can be either a horizontal show or a vertical show. The horizontal show displays all products from a specific industry and the vertical show, which displays specific product of a specific industry (Robbe 10-14).

Today tradeshow or trade fairs are exhibitions that are specific to a trade. “They are targeted at specialized audiences of purchasers and industry competitors” (Lorenc, Skolnick and Berger 90). Since there exists number of different trades, there is usually a tradeshow taking place at any given time, around the world. There may be numerous tradeshows pertaining to a specific trade with the prerequisites of the audience group remaining the same or different. This provides companies tremendous opportunity to position and introduce themselves in the market amongst their competitors as well as be up to date with them. Companies may or may not choose to participate in some or all the tradeshow pertaining as per their marketing plan.

2.3 Importance and Effectiveness of Tradeshows

An ever growing industry, tradeshows are an integral part of any company’s promotional mix and the marketing strategy. There are several advantages at exhibiting at tradeshows:

- Many companies use exhibitions in the selling process more than they do business-to-business advertising, direct mail, or public relations.
- Exhibitions are more effective than advertising, direct mail, and other marketing media components in generating sales leads, introducing new products, and resulting in orders.
- Some 91 percent of business decision makers report that exhibitions are "extremely

useful" sources of purchasing information. They rank exhibitions number one for purchasing information among 13 sales and marketing tools.

- Exhibitors who integrate marketing tools in their trade show activities, as well as set, measure, and quantify objectives, are more successful than those who don't.
- Exhibitions help companies to reach new prospective customers. Only 1 in 10 visitors to a given company's exhibit has had any contact with that company prior to the show.
- Exhibitors who integrate marketing components into a total exhibition program increase both their visitor attraction and lead conversion efficiency. (Robbe 7-8)

Tradeshows are different from any other design solution adopted by manufactures and companies because they allow face-to-face interaction with prospective clients, and build on human relation and interactions. This acts as an added advantage to the tradeshow industry even during the times of downward trends.

> "…and remarkably, though the industry is cyclical, it can grow even during a down trend in the business community, because with business travel costs rising, corporate belts tightening, and reduced travel and entertainment budgets, face-to face contacts still costs less than 50 percent of the average non-show sale calls" (Robbe 17)

This face-to face interaction is coupled with the visitor product interaction. Even with the new virtual tradeshows (Second Life), Skype, YouTube, and online meeting services, there would remain a need to satisfy the need to inspect. This is not possible with the virtual tradeshows. In a virtual tradeshow setting you meet, interact and experience human interaction that is only simulated. Historically, tradeshows were always a form of market; the need for people to interact and experience excitement can only be created with personal involvement. The 'buzz' of an environment engages all the five human senses. Tradeshows

are not just for seeing and hearing with your own eyes, butalso for touching with your own hands.

2.4 Exhibiting at Tradeshows

There may be many objectives of a company participating in a trade show. The general objectives of every company is to develop a new territory, test market a new product, increase product awareness, increase sales, expand media coverage, and build a image. (Konikow 1984, 10-13)

Tradeshow exhibit designs are aimed to promote brand image, to create strong presence of a company, attract potential clients, engage them in the exhibit, highlight the products displayed and provide an environment to facilitate all these objectives (Robbe 62-63). “Today's exhibit manager can no longer use a single exhibit for all the shows on his schedule, but must acquire a variety of presentation packages for a multitude of corporate objectives” (Konikow 1988, 23). Every exhibit has an objective and a message to communicate. Exhibits need to promote and introduce new product lines, changing trends of a particular trade or market, competition with other exhibitors, and essentially need to stand out and enticing the visitors to the exhibit booth; all call for exhibits to be constantly updated from tradeshow to tradeshow or even completely revamped. Since the tradeshows are trade specific with pre qualified visitors, the visitors may be the same from year to year, and this further pushes the need for the exhibit to look different each time.

Design of the exhibits is done at design firms, following the tradeshow guidelines and space, while fabrication and construction take place at exhibit manufacturers. Once the exhibit has been built, it is then shipped to the venue. After the show the exhibits are either

shipped to the warehouses for storage, or are discarded or recycled. Since shipping is a big part of the tradeshow, exhibit design structures need to be lightweight, sturdy components, portable and offer quick set-up. These features are in addition to the high impact graphics, innovative designs and company image building that the tradeshow exhibit design must possess. (Velarde, 1989)

Participants for a trade show range between small, medium and large size companies. There are many types of tradeshows that target different audiences and locations. Businesses decide on which tradeshow to attend and not to attend based on their marketing strategy and budget; these factorshelp to decide on how much is to be invested from one tradeshow to the other (Robbe 62,63). A small company can plan to invest in only one tradeshow and devote its entire budget to that exhibit, or decide to distribute it between a number of different tradeshow exhibits. Similarly a big company can invest in a large or a small exhibit depending on their marketing needs. A tradeshow exhibit's budget and size then works hand in hand with these requirements and strategies.

Typically tradeshows provide different size spaces (or ***booths***) that companies can rent and set up their exhibits in. Sizes of exhibit are categorized into:

- Small exhibits: ranging from 400 square feet/37square meters or less
- Medium exhibits: ranging from 401 to 1,600 square feet/37 to 148 square meters
- Large exhibits: ranging from 1,601 to 4000 square feet/149 to 371 square meters
- Giant floor exhibits: greater than 4000 square feet/371 square meters
- Freestanding or self contained exhibits: requiring small space and needing no assistance- like pop-up or table top displays (Konikow 1984)

The layout or configuration of the booths differ and are based on the floor plan of the

tradeshow.Booth falls into three different categories namely: back wall or inline, island, peninsula and corner booth:

- The most common back wall or inline space is 10-by-10 feet, and other size variations include 10-by-20s, 10-by-30s, or even 10-by-40s, with each option measuring 10 feet back from the aisle.
- All sides of an island space are exposed to the aisle; thereby eliminating neighbors connected by exhibit walls. Island sizes typically begin at 20-by-20 feet, but islands come in myriad sizes and can exceed thousands of square feet.
- Peninsula spaces are similar to island spaces, but they have aisles on only three sides, which means one side is shared with another exhibitor, a wall, or a pipe-and-drape barrier. They are typically used in 20-by-20 foot or larger spaces and can exceed thousands of square feet. (Exhibit Structures and Space Configurations, 'Exhibitor' magazine August 2006)
- Corner Booth is the exhibit space that has at least two aisle sides exposed to traffic. Since they are the corners of the back wall or inline booths their size 10-by-10 feet, and other size variations include 10-by-20s, 10-by-30s, or even 10-by-40s, with each option measuring 10 feet back from the aisle. (Robbe 47)

2.5 The Small Size Exhibit

While companies are free to choose any size of exhibit, small to mid size companies generally opt for freestanding or small exhibits due to their limited budgets. "Roughly two-thirds of all exhibitors use a 10-by-10 foot space, and 18 percent use a 10-by-20-foot or a 10-by-30-foot space" (Michael Thimmesch, 2006).This number is indicative of the significant

number of exhibits designed for tradeshows to fit the basic 10-by-10 and a 10-20 foot space, both of which fall under the “small size” exhibit category. In spite of being the smallest of the booth sizes, the small booth exhibits can utilize many construction approaches: custom exhibits, portable displays, panel displays and modular systems. The most common of these are the custom exhibits and the modular systems, each of which has its own advantages (Konikow 15).

2.6 Custom Exhibits

A custom exhibit is tailor-made to the needs of the particular company. The custom exhibit uses all kinds of material in order to create the environments that communicate effectively for the company’s marketing needs.

Large companies invest in big custom exhibits that travel around the world. They are a popular approach that even small exhibitors opt for, because they give freedom with the exhibit structures, allowing them to be creative and to have intricate and unique design structures. Another advantage of the custom exhibit, which helps the overall exhibit structure and design, is the selection of materials used. Different materials provide different structural uniqueness, effects of lighting and tactility that all add up to the overall impact of the exhibit which let it stand out against its competition.

The disadvantages associated to the custom exhibit arise from the freedom associated with it. Creative designs and free flowing structures do not add up for easy shipping. In addition to design costs, these specific structures often require special shipping crates to be designed, which increase the logistic expenses. Additional drayage costs are incurred if the materials used are heavy or extremely fragile. Custom exhibits are not easy to

set up. Labor costs for each setting up and dismantling of the exhibit and compliance with the labor union rules act as further shortcomings to a custom exhibit (Robbe 74-77).

2.7 Modular Exhibit Systems

A modular exhibit system can be described as exhibits constructed with interchangeable components that can be reconfigured to be set up in various arrangements and sizes. Modular exhibit systems were introduced in the early 1970's, and were created taking tradeshow needs into account. They were designed for easy shipping and set-up with the potential to be reused in different configurations of the parts to produce numerous variations. Modular systems carry along with them certain advantages that would not be available otherwise. They provide strength to the structure without being as bulky as traditional wood structures used in custom exhibits. They are made of lightweight metals and provide flexibility of attaching compound angles just like in custom exhibits. The lightweight components and easy connector hardware make it possible to set-up yourself, avoiding union labor. Other advantages include reduced production time, refurbishing, handling, crating, and shipping costs and labor for set-up and dismantling. In addition, they have the capability to be re-configured to meet marketing objectives with no additional costs.

The main disadvantage of the modular system is that it takes time to become familiarizedwith its working mechanics. This has led to assumptions of being labor intensive by those who attempt to learn, and of being mundane systemsby those who do not attempt to learn.

> "The biggest problem in understanding systems, their design, application, and economics, is usually the time required to become familiar with them. People thought their

> lives or their businesses would be better organized by turning on a personal computer, until they saw all the documentation there was to read" (Konikow 23).

Even though the capabilities of modular exhibit systems have been advertised and even made use by some manufacturers, there is a definite hole in the way the modular systems has been showcased. Though modular systems were made to be re-designed into a number of different exhibits to meet the marketing objective and unique design advantages, in short producing multiple possible exhibits, the current modular exhibits on the market may have faced a similar problem mentioned above. The modular companies have failed to acknowledge the importance of educating their customers, and have not provided simple instructions about the multiple configurations possible. As a result, the versatility and range of exhibits thatmodular systems can produce has been overshadowed by the promotion of these systems as merely being used for logistic viability and easy setup purposes.

The modular exhibit systems have fallen prey to the misconceptions, lack of awareness and poor showcasing the full potential of their reconfiguration feature. This has affected the current modular exhibit systems that are being manufactured indicating that the original modular exhibit systems have been lost along the way.

The current modular tradeshow exhibit systems are essentially sold as exhibits and not as a component system. Portions or sections of such an exhibit could be used for smaller booth spaces or new hardware could be added for increased booth spaces. This re-configuration ability of the current modular exhibit systems is much more limited and restricted compared to the original modular systems that allowed reconfiguration of the components. The number and variety of exhibit designs that can be created using the components of a system are much more compared to those constructed from sections of an

exhibit. This alteration to the reconfiguration feature of modular exhibit systems affect both the extent of variety and number of exhibits that can be created from a single system.

The recent modular exhibit systems also provide easy change in graphics on the exhibit structure. Though this feature was also provided in the original modular exhibit systems, it is now much more technologically advanced and easily set up. The current modular exhibit systems have undergone a lot of alterations and transformations owing to its past shortcomings and the current tradeshow trends. They have lost more and gained less in comparison to the reconfiguration potential that they had originally displayed.

2.8 Current Tradeshow Trends

2.8.1 Customization: Custom-Modular Exhibit

Exhibitors prefer the creativity that goes into custom exhibits, and hence like working with them. While the custom exhibit can be exactly tailored to the specific marketing and design needs of a company. But they do not work under any system and use a wide variety of materials, mostly wood for the construction of the structures. This makes them heavy, cumbersome and logistically unviable. Today's tradeshow industry is trying to combine the advantages of custom exhibits and the functional advantages of the modular exhibits. One recent attempt is a new line of modular systems called the "custom modular systems". These new custom exhibits are designed using lightweight and easily transportable materials to construct an exhibit that may or may not be reconfigured to break down into smaller trade show displays. They provide the exhibitors an opportunity to choose from a vast range of custom component options that help make the exhibit more unique.

These new custom modular exhibits provide the potential flexibility to break down into smaller exhibits and the ability to re-configure to fit a variety of spaces, while the design themes remains essentially the same. Figures 2.1- 2.4 are product samples for custom-modular exhibit design showcased by Nomadic Displays (www.nomadicdisplay.com), featuring the re-configuration capabilities of one of their products.

Figure 2.1. Sample Custom Modular exhibit size1 (www.nomadicdisplay.com)

Figure 2.2. Sample Custom Modular exhibit size 2 (www.nomadicdisplay.com)

Figure 2.3. Sample Custom Modular exhibit size 3 (www.nomadicdisplay.com)

Figure 2.4. Sample Custom Modular exhibit size 4 (www.nomadicdisplay.com)

These custom modular exhibits are sold as a big size exhibit and not come as kit of parts or components that can be reconfigured into different looking exhibits. Each big exhibit is a compilation or arrangement of smaller exhibits, which can be used individually in smaller exhibit booth spaces as per the exhibitor's needs.

The above example shows how a big exhibit converts into exhibits for different size booths. This would save a huge amount of resources and reduce the environmental impact that would be have occurred for the construction of new exhibit each time. Even then the new custom modular systems, like the traditional modular systems, are not credited or marketed as a sustainable feature.

2.8.2 Rate of Change or Life of a Tradeshow Exhibit

The fast rate of change is typical to the tradeshows. But the looking at the increase in the kinds of products that are generated by companies and manufacturers and rate at which they are produced the competitiveness of the companies and the rate at which technology is developing makes it an inevitable trend to keep to date their exhibit designs at a much faster rate.

> "Trade show designs focus on promoting a client's brand; hence it is critical to redesign the exhibition regularly in order to keep pace with changes in the company. ….. The life span of these exhibitions depends on the client and the industry. A typical design can last between one and five years and its duration on the trade show floor is limited from three to five days either annually or several times a year in different locations. Exhibitions need to be adaptable and durable enough to be used at various shows, and appeal to different audiences" (Lorenc, Skolnick and Berger 90)

Every company (small or big) participating in tradeshows is affected by this rate of change. Interviews with the manufacturers of modular systems revealed that the modular exhibits are used for about two or three times before the companies invest in a new exhibit for subsequent tradeshows, due to the need for constant up gradation to the exhibit design. (Interview with Tim Morris, Tim Morris, president, Eco-Systems Sustainable Exhibits Inc.). This short life span of the tradeshow exhibits has many implications. First, the increased costs incurred to the companies in order to invest in new exhibits often every two to three uses. This investment may not be of a big concern to the big companies with larger budgets, but for smaller companies these additional costs hamper their financial plan.

The second implication is that for small to midsize companies who generally opt for modular exhibit systems investing in brand new exhibits are not seeing the reusable aspect of the modular exhibit system. This brings us to the probability that the current modular exhibit systems are not being showcased properly. This is indicative of a gap between what can be achieved by using modular exhibit systems and the way it is showcase.

The irony of this oversight is that the re-usability features of the modular tradeshow systems are not being credited as being sustainable when looking right at it. Durable materials, multiple re-uses, interesting designs are all about modularity as a sustainable approach and are being thought of innovation in the practices of sustainable or green design. But the modular exhibit system while follows similar approach it is not being credited for the same.

2.8.3 Sustainable and Unsustainable Practices in Tradeshows

Sustainable design can be defined as:

> "the balanced use of natural, social and economic capital for the continued health of the planet and future generations. Designers can enter into the discussion and begin to adopt sustainable practices at a variety of levels depending on their individual levels. Even professionals who have spent decades immersed in this issue agree that we have yet to find the perfect way of balancing our economic needs with the needs of the planet. Therefore, sustainable practice is more about working toward many small goals than it is about living with absolutes" (Aaris, 12)

Based on this definition, tradeshows exhibit indulges in many wasteful practices. These practices start with fuel and energy consumption to setup the exhibits before and during the tradeshow and continue with the wastage of materials form the exhibit structures

after they are finished with the tradeshow. There is no end to this cycle as this process repeats after every tradeshow. Tradeshows are the second most wasteful industry according to the U.S. Environmental Protection Agency (Lisa Plummer, Tradeshow Week, 12/10/2007). The reports on global warming and the entire world taking steps towards sustainability, the tradeshow industry had also made it move. Energy drainage associated with lighting, energy lost for shipping and handling heavy exhibits, printing and use of chemicals and inks that are harmful and the wastage of materials all factor in making the environmental sustainability important to exhibit designers. "Exhibition designers are using threeapproaches to achieve sustainability:decreasing energy consumption, usingrecyclable materials, and decreasing the use of harmful chemicals" (Lorenc, Skolnick and Berger 124).

Exhibits now use lightweight, recyclable materials, use of non toxic inks and dyes used that are soy or water based which all work towards a more sustainable design of an exhibit. "Recycling plays a notable role in designing for the low environmental impact of materials' end of life treatment" (Vezzoli, Manzini, 161). But the structural materials that the exhibits use are sturdy and can be re-used. It is not essentially the end of their life. The main stages of recycling are distinguished collection and transportation, identification and separation, disassembly and/or crushing, cleaning and/or washing, pre-production of secondary raw material. The whole process of recycling takes more in terms of economic and energy input. It might not be completely sustainable to recycle the exhibit materials after every/handful of tradeshows. Fully utilizing the product until its completion of life cycle is equally important.

> "A more perpetual product, with otherwise similar functions, will generally secure a lesser impact on the environment. While a product with a shorter life span not only creates

> untimely waste, but also a new indirect impact caused by the demand for product replacement. Pre-production, production and distribution of the new product, which would cover the functions of the old one, compels further consumption of resources and creation of emissions" (Vezzoli, Manzini, 161).

Best practices of sustainable design also look at designing for longevity/re-use for materials that consume fewer resources during utilization. The framework/structures of modular exhibits systems fall under this category. This is indicative that modular systems provide a sustainable approach to tradeshow exhibit designs by increasing the life cycle of the exhibits. Again there seems to be a gap in understanding the capabilities of modular exhibit systems and in applying and advertising them. Modular exhibits are not advertised or credited as sustainable systems in literature or practice. The new "Green-modular exhibits"that are currently being manufactured for tradeshows are an indication to this gap.

2.8.4 Green-Modular Exhibits/ Green Custom/Green-Custom Modular Exhibits

Green exhibits, Green modular exhibits and the green custom-modular exhibits are similar to custom modular exhibits that were mentioned previously but follow a sustainable process and use recyclable raw materials, nontoxic inks and degradable printing surfaces. The manufactures of these exhibits focus on the entireexhibit designing processto be more sustainable. The main areas of focus are sustainable materials, engineering technology, use of modular features, and recycling or reusing. The sustainable/ green approach is a very recent concept and so are the most significant areas of focus. Modular exhibit systems had undergone major transformations and the original concept of modular systems had been long

elapsed, for direct connections to be made with as a solution for sustainability in tradeshow exhibits.

Unlike the original modular exhibit systems these Green-custom/green-modular/ exhibit design systems make use of the modular features to reconfigure part or entire component of the modular exhibit system into similar smaller exhibit spaces (like the custom-modular exhibits) but not utilizing the modular aspects to create numerable custom exhibits. The reusing of the exhibit is not as a whole. These exhibits are dismantled and reused in parts and pieces increasing the percentage of material to be recycled. This reduces the life cycle of the overall exhibit.

Using the technology and recyclable raw material and other sustainable practices increases the cost of a green exhibits compared to the non-green options. Though exhibit structure is proportionally only a small part to the overall cost of participating in a tradeshow it affects the budget of the companies (especially the small to mid-size companies). In spite the companies being aware and willing to take sustainable approaches, the decision to choose or not to choose the green exhibits heavily depends on the how much the company can invest in an exhibit. Hence, though there is awareness and intent for sustainability is there, the cost factor does not allow the companies to opt for the greener options.

2.9 Summary

The literature review indicates two main gaps in the tradeshow exhibit industry that could prove crucial. The first gap is indicated as incomplete utilization of the modular systems. It basically points to the issue of modular systems being prey to assumptions and unfamiliarity towards application of these systems. The unfamiliarity could be indicative of

the insufficient information and options provided by the manufacturers of the modular systems. For example Lacet Modular System Manuals Manual and Design Guide provide detailed information on shapes, measurements and connection details. They also provide many exhibit designs constructed from the components but do not provide any information regarding the overlapping components. This does not give the opportunity to the companies/exhibitors to select components that can integrate to form more than one exhibit. Once the exhibitor chooses an exhibit, he would expect to use the same components to be used to forms following exhibits. This is not clearly showcased in the Lacet Modular System Manual and Design Guide.Figure 2.5 is a page from the Lacet Design Guide showcasing the plan drawings of different exhibit structures and the components used in their construction. This page is supplementary and coordinates with the three-dimensional drawings exhibit structures displayed through out the Lacet Design Guide. It can be noticed that exhibit designs components used in each of the structures are independent from one structure to the other, giving no indication that components from one exhibit can be used to create other different looking exhibits.

The second gap is realized when modular systems are not completely utilized and promoted as sustainable design. Modular exhibits had already fallen out of favor before green design became important; this partly explains why no one has looked to modular systems as a green solution before now.Literature points that unlike the modular systems' original purposes the current generation of green, modular, or custom exhibits is not working towards extending the lifecycle of the exhibits.

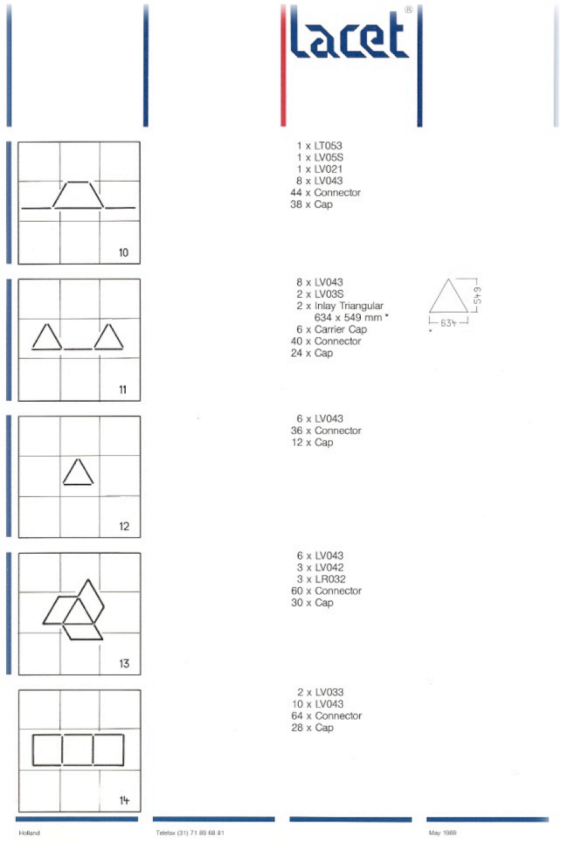


Figure 2.5. Plan drawings of different exhibit structures and the components used in their construction (Lacet Design Guide, May 1989)

Even with the fast rate of change of tradeshows, modular exhibit systems are capable of providing umpteen custom exhibit options. Therefore not utilizing the modular feature towards sustainability is indicative of not presenting/showcasing the modular systems correctly. Modular exhibit systems cut cost (structural costs) of exhibits by increasing their lifecycle. If this feature is completely utilized towards sustainable exhibit design it will automatically minimize the green exhibits' costs allowing many mid to small size companies to also invest in green exhibits without compromising on design or their budgets.

CHAPTER 3. METHODOLOGY

3.1 Introduction

The previous chapter attempts to document modular tradeshow exhibit designs and practices, as well as the current trends in the tradeshow industry. Literature reveals that the modular tradeshow exhibit designs are still in use but are not viewed as examples of interesting structures. Custom exhibits have found their way into smaller and smaller booths. The literature also emphasized that sustainable-green exhibit designs are the current need of the hour and that new modular exhibit systems are also taking the sustainable route. There are examples of sustainable exhibits that exercise greener methods by the use of recyclable materials, using local products, innovative material and technology and manage logistics to minimize the overall carbon footprint of the exhibit in use. These solutions though greener, incur more cost to construct creating a need for more cost effective exhibit solutions.

The literature suggests the requirement of sustainable yet cost effective modular exhibit systems could be more widely accepted if the cost-effective and functional modular systems are made more interesting. Further, interviews with the manufacturers of exhibit/green-exhibit/green-modular/green-custom modular exhibit helped shed light on current tradeshow practices. According to this information, the manufactures focused on the entire exhibit designing process to be more sustainable. These green-modular exhibit design systems concentrated on sustainable materials, engineering technology, use of modular features to reconfigure part or entire component of the modular exhibit system into new exhibits designs to fit new spaces ranging from 10X10 feet to 60X70 feet areas, recycling

and maximum reuse of material. All these add up making the green- modular exhibits more expensive compared to the non-green versions.

The decision to choose or not to choose the green exhibits heavily depends on the how much the company can invest. So even though there is awareness and intent the cost factor does always not allow the companies to opt for the greener options. Additionally the new modular exhibits are being customized. Like custom exhibits they provide the companies to select/design the exhibit as per their requirements. But unlike true modular exhibit systems (with limitless configurations for new exhibit designs each time), their modular aspects are limited to reconfiguration from a big exhibit size to a smaller size exhibit that all look similar.

Information received in the interviews also report that both these modular systems (green and non-green modular systems) are used for about two or three times before the companies invest in a new exhibit for following tradeshows. Thus not utilizing the full potential of the reusable features to increase the lifecycle of the exhibits, in-turn making them more sustainable. Investing in a brand new exhibit every two to three uses points to the fact the modular exhibit have not been able to showcase and achieve variety of exhibit designs from a set of modular components. Further implications of this use would be the costs incurred to the companies in order to invest in new exhibits every two to three uses.

The hypothesis for this study states that

1. If showcased in a simple and easy to understand manner, a set/kit of modular exhibit design components could be designed to create a variety of exhibits that look significantly different without becoming boring.
2. This “reusability” of components in modular exhibit systems could lend itself to

improve the sustainable features of the exhibits.

To test this hypothesis, it was necessary such a modular exhibit system be created that provides a variety of significantly different exhibit design configurations from a single set of modular components. As per typical use of modular systems that fit the small exhibit size, the prototypeswould be constructed to fit a 10X10 or 10X20 foot space.

Prototyping or model-making is a valid and rigorous design methodology widely used in the fields of product design (toys, automobiles, consumer electronics, footwear, medical products, home appliances and housewares), architecture, industrial design, museums and exhibit design. It is extensively used in the design process right from the stages of brainstorming to the testing of the designs (www.modelmakers.org). It is also widely used in other fields of interaction design, engineering, science to create better interfaces (Sears, Jacko, 1018-1037). For this study, scaled model prototypes of modular components were created to form a variety of significantly different exhibit design configurations from a single set of modular components.

3.2 Test Materials

The Lacet Panel System from Laarhoven Design was selected as the basis for these prototypes because it provides a multifunctional panel system that can connect the panels together at any angle between 0 to 360 degrees. It was introduced in 1984 in the United States as an expansion of the company's product line. Compared to other modular exhibit systems, Lacet offered more sculptural qualities. Its panel shapes ranged from simple squares to more varied trapezoids and quadrilaterals. This allowed the exhibits created form Lacet to have added dimensional interest. Other features include the panels linked by connectors only,

easy installation and dismantling, no tools required for installations and most importantly limitless configurations of the panels.

The Lacet Panel system, though not currently in production, was selected over the current modular exhibit systems because it showcased true potential of a modular exhibit system. It allowed working and reconfiguration of the components of a system, unlike the current modular tradeshow exhibit systems, which do not work with components but instead with sections/portions of an exhibit.

Lacet Panel System from Laarhoven Design was a very popular modular tradeshow exhibit system in the 1980's -1990's that offered significantly different designs from the same set of components. There is a constant necessity for tradeshow exhibits to update themselves according to new products and changing market needs, and although it was capable of great variety, Lacet was not able to showcase itself as a solution to this requirement. There were two main communication discrepancies in showcasing the Lacet system. First, the Lacet manual/catalogue presented its customers with only a limited amount of examples of designs that the system could be rearranged in. Since this is an intricate system the customers soon exhausted the few designs that were shown in the Lacet catalogues and by the dealers.Secondly, the exhibitors who tried reconfiguring new designs with the system needed to put in a lot of hours, and needed technical and creative minds to come up with new designs.

The Lacet System was very popular due to its unique and functional features. But for the reasons above, it was perceived as a system that was limited in designs and was time/labor consuming.

3.2.1 Designing the prototype component Kits

The Lacet system developed a great number of basic shapes ranging from squares and rectangles to trapezoids to pentagons. For this reason, the modular prototypeswould utilize the shapes developed by the Lacet Panel System. The shapes of the components used for the study are selected from the shapes shown in the Lacet Panel System (Design Guide 1 and 2). The design guide provides options for change in panel material (example glass, plexi etc). Additional options such as curved panels, and in-lit lighting options were not utilized in this study.

3.2.2 Instruction Manual

While this study focuses on the development of a set/kit of modular exhibit design components and the prototypes, it is important to showcase these in a simple manner portraying their full potential to the exhibitors. The compilation of this information would be utilized to introduce and present the proposed kits and prototypes and would present the information in the following manner:

1. Information on the components available
2. Kits formed the components and quantity of components
3. Each kit of components followed by the prototypes that were constructed out of each kit. This would also include the quantity and number of each component utilized in each of the prototype as well as the type of exhibit, function and booth space that is associated with each of the prototype.

This would allow the exhibitors to understand how one kit could produce a number of different exhibits, how exhibits within each kit are structurally and functionally different. The

following information in the subsequent sections on the proposed components, kits and prototypes could be compiled as instruction manual, PDF or an online resource.

3.3 Components

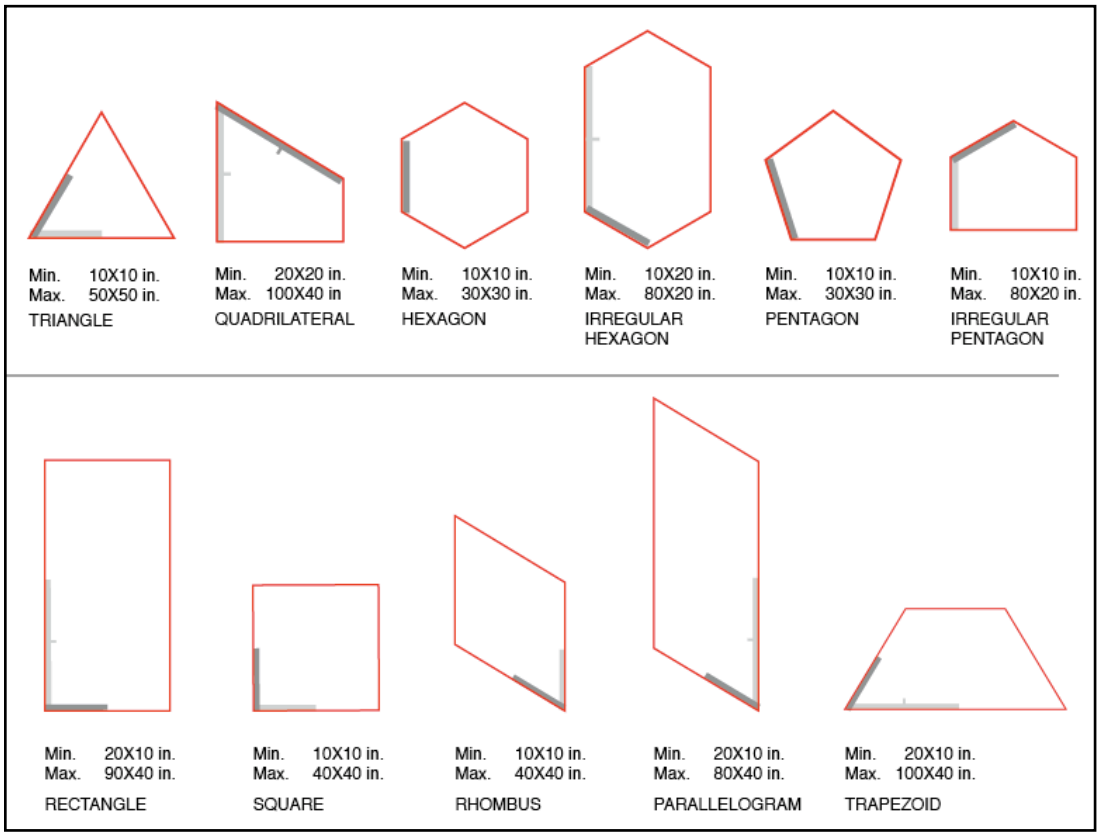


Figure 3.1. Selected sizes and the minimum maximum range of the Lacet System components for this study

The measurements for the components were formulated within the minimum and maximum measurement range given for each of the shapes in the Lacet design manual. The measurements ranged from ten inches to one hundred inches (i.e. 8 feet and 4 inches) and the relation of sides is different for each shape. This allows innumerable size variations within each shape. For this study the relation of sides and the minimum and maximum

measurements were maintained for the selected shapes as per the Lacet System (Figure 3.1). The selection criteria were to have size variations in each shape constituting small, medium and large measurements, which match to the size variations of other shapes (Table 3.1).

Table 3.1. Size Variations and Nomenclature for the Components and Shapes selected from the Lacet Manual

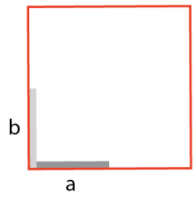
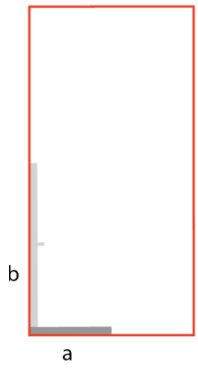
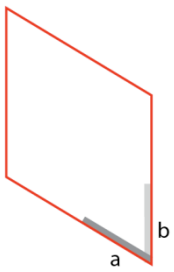
	COMPONENT CODES: Letters stand for the shape Second digit is the multiple of the module (10 inches) indicating related side A Second digit is the multiple of the module (10 inches) indicating related side B		
SHAPE	**COMPONENTS CODES**	**MEASUREMENTS of SIZE VARIATIONS**	**QUANTITY**
SQuare  	SQ11 SQ22 SQ33 SQ44	10X10 20X20 30X30 40X40	3 3 3 3
ReCtangle  	RC12 RC24 RC36 RC48	10X20 20X40 30X60 40X80	3 3 3 3
RHombus  	RH11 RH22 RH33 RH44	10X10 20X20 30X30 40X40	3 3 3 3

Table 3.1 (Continued)

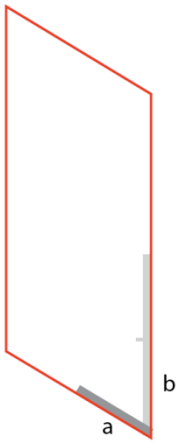
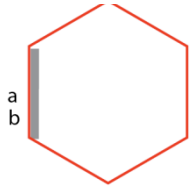
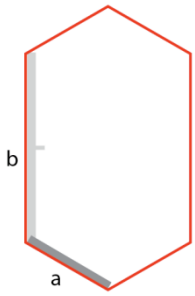
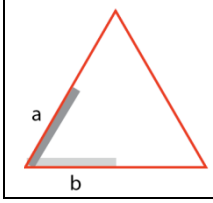
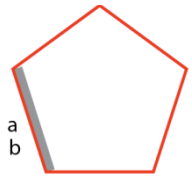
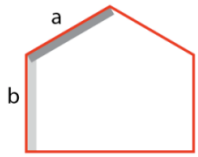
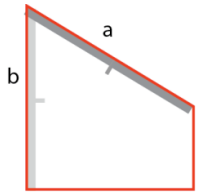
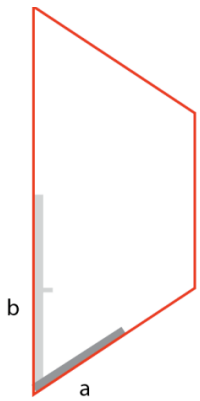
ParaLlelogram 	PL12 PL24 PL36 PL48	10X20 20X40 30X60 40X80	3 3 3 3
HeXagon 	HX11 HX22 HX33	10X10 20X20 30X30	3 3 3
Irregular Hexagon 	IH12 IH14 IH16 IH18 IH24 IH26 IH28	10X20 10X40 10X60 10X80 20X40 20X60 20X80	3 3 3 3 3 3 3
TRiangle 	TR11 TR22 TR33	10X10 20X20 30X30	3 3 3

Table 3.1 (Continued)

PenTagon 	PT11 PT22 PT33	10X10 20X20 30X30	3 3 3
Irregular Pentagon 	IP11 IP12 IP14 IP22 IP24 IP26 IP28	10X10 10X20 10X40 20X20 20X40 20X60 20X80	3 3 3 3 3 3 3
QuadriLateral 	QL22 QL24 QL26 QL28 QL44 QL46 QL48	20X20 20X40 20X60 20X80 40X40 40X60 40X80	3 3 3 3 3 3 3
TrapeZoid 	TZ24 TZ26 TZ28 TZ46 TZ48	20X40 20X60 20X80 40X60 40X80	3 3 3 3 3
			TOTAL = 153

For the prototype, a total of 153 components were selected from ten shapes. Three 'Kits' of components were formed from the total components selected and formulated for the study. There was no particular format to form the kits, but it was a conscious decision to use different shapes from one kit to another. The intention was to construct as many exhibit configurations as possible from each Kit. While there could be numerous arrangements constructed from each kit, the scope of this study was limited to a total of six prototype configurations per kit.

The current modular systems utilized the modular aspects to provide for change in booth size, from big to small exhibits, as per the needs of the exhibitors. Since the focus of this study was limited to small exhibits the size variation that were considered were either 10X10 foot or a 10X20 foot exhibit booth space, both of which fall under small exhibit size booth space.

The prototypes constructed from each set of components weredescribed in terms of traffic layout, function and structure of the exhibit and each prototype was constructed in a 10X10 foot or a 10X20 foot booth space. The comparison would also look at the utilization of most of the parts at least thrice (half the number of prototypes) in every kit. The prototype from each kit offered both 10X10 foot and 10X20 foot options, which allows the exhibitors to choose a booth as per their marketing needs and make use of the components from the same kit for the exhibit, without having to invest in a new one. This ensured that every component was accounted for and its potential was not wasted by only one or two uses.

This collection of prototype exhibit arrangements explored how effective these modular components were at accomplishing interesting, variable tradeshow exhibits from one year to the next using the same kit of parts. If they were to accomplish this, it would

suggest a new reason to consider the use of modular exhibits: their re-usability would make them a green choice.

3.4 KITA

A total of sixteen components are used in this set. The majority of components belong in this set are rhombus and trapezoid. Other component shapes include rectangle and hexagon and parallelogram (Table 3.2).

Table 3.2. KIT A Components (16 pieces)

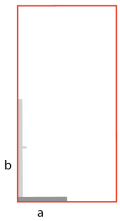
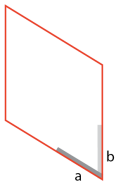
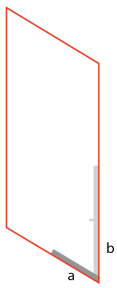
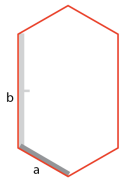
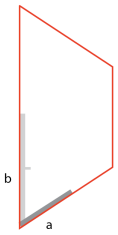
SHAPE	COMPONENTS	Number of Pieces
RECTANGLE 	RC12	2
RHOMBUS 	RH22 RH44	2 1
PARA**L**LELOGRAM 	PL48	2

Table 3.2 (Continued)

IRREGULAR **H**EXAGON 	IH24 IH26	1 1
TRAPA**Z**OID 	TZ24 TZ26 TZ28 TZ48	1 1 2 3

The sixteen components from Kit A are re-used in the construction of the entire prototype A1 to A6. The use of each component is not the same in every prototype. Eleven of the sixteen components are reused at least in four prototypes; that is, in two thirds of the prototypes and only two of the sixteen components are reused in at least three prototypes, which accounts for half the number of prototypes. This meets the objective to reuse all the components for a minimum of three prototypes (Table 3.3).

Table 3.3. Matrix to compare the component reuses in different KIT A Prototypes

COMPONENTS	RC12 (X 2)	RH22 (X 2)	RH44 (X 1)	TZ24 (X 1)	TZ26 (X 1)	TZ28 (X 2)	TZ48 (X 3)	PL48 (X 2)	IH24 (X 1)	IH26 (X 1)	TOTAL
PROTOTYPES											
A1	2	2	1	1	0	1	2	2	0	1	12
A2	0	2	1	1	0	2	3	1	1	1	12
A3	2	2	0	1	1	2	1	2	1	1	13
A4	2	2	0	1	1	2	1	2	0	1	12
A5	2	2	1	1	1	1	3	2	1	0	14
A6	0	2	1	1	1	1	3	0	1	0	10

Components used in minimum four prototypes
Components used in minimum three prototypes

3.4.1 Prototype A1

Table 3.4. KIT A components used in Prototype A1

Components Used in A1	Quantity Used (nos.)
RC12	2
RH22	2
RH44	1
TZ24	1
TZ28	1
TZ48	2
PL48	2
IH26	1
	Total 12

Prototype A1 is constructed from twelve components (Table 3.4). It demonstrates a simple structure that is enhanced by use of vertical structures to create an interesting exhibit. Functionally, this structure provides both the tabletop counter and vertical panels. The tabletop can be used for three-dimensional product display; while graphics or wall mounted information can be put up on the vertical panel (Figures 3.2 and 3.3).

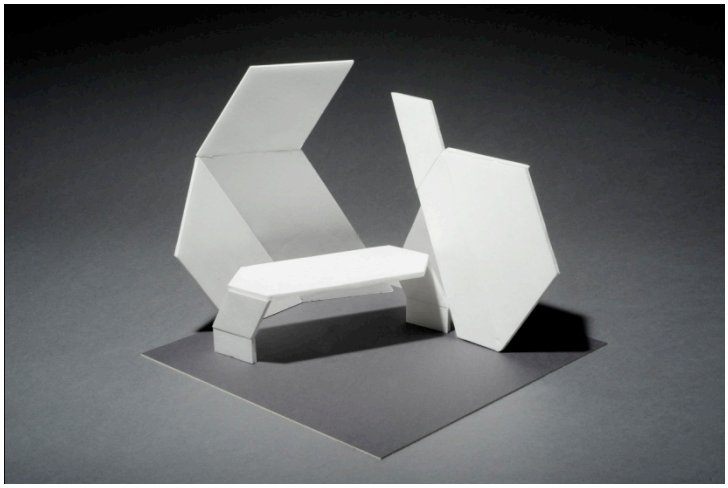


Figure 3.2. Front view of prototype A1

Figure 3.3. Side view of prototype A1

The structure best fits a corner exhibit space, and allows the visitors to enter the booth on two sides, but can also work well in a regular inline space. The booth attendant/hosts can potentially stand behind the tabletop counter or in front of the wall-mounted display without obstructing the traffic to the exhibit. Though the ten by ten feet booth spaces do not allow elaborate seating, temporary chairs can be arranged for conversations across the table (Figure 3.4).

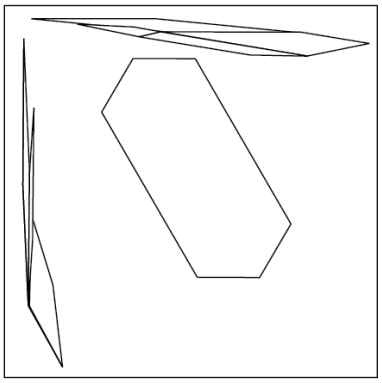


Figure 3.4. Plan view drawing of prototype A1

3.4.2 Prototype A2

A total of twelve components are used to construct Prototype A2 (Table 3.5). Itsports an L-shaped tabletop counter spanning across the exhibit space. A second level tabletop counter is located below the L-shaped tabletop on same side as the main back panel.

Table 3.5. KIT A components used in Prototype A2

Components Used in A2	Quantity Used (nos.)
RH22	2
RH44	1
TZ24	1
TZ28	2
TZ48	3
PL48	1
IH24	1
IH26	1
	Total 12

This dual-level counter space can be used to display three-dimensional products and as a point of purchase display. Since the tabletop is L-shaped, a part of it can be used for

display purposes, and a part for attendee visitor meetings. The tabletop section adjacent to the main panel allows enough legroom to accommodate a wheelchair (Figures 3.5 and 3.6).

Figure 3.5. Front view of prototype A2

Figure 3.6. Three quarter view of prototype A2

The structure is constructed for a ten by ten foot booth that can be entered from two sides towards the tabletop counter, and best fits an inline space or a corner booth space. The space available behind the counter adjacent to the panel could accommodate one attendant/host or could also be used for storage of products or giveaways during the exhibit (Figure 3.7).

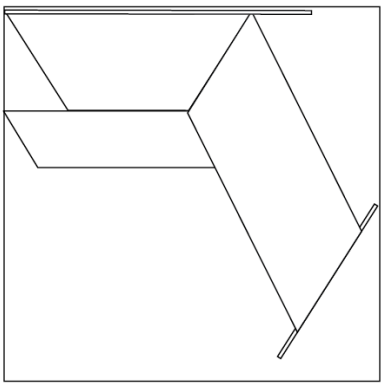


Figure 3.7. Plan view drawing of prototype A2

3.4.3 Prototype A3

Table 3.6. KIT A components used in Prototype A3

Components Used in A3	Quantity Used (nos.)
RC12	2
RH22	2
TZ24	1
TZ26	1
TZ28	2
TZ48	1
PL48	2
IH24	1
IH26	1
	Total 13

Prototype A3 utilizes thirteen components from the sixteen available in Kit A (Table 3.6).The exhibit engages the entire booth space with vertical structures and acts as an enclosing contour (Figures 3.8 and 3.9). A double level table structure is located on one side of the space. This large vertical structure is the primary display area, which can demonstrate wall-mounted display of information or of two-dimensional products. The two level tabletop

counters can be used to display three-dimensional products, brochures or give-away items, and can also be used for a space where one on one interaction can take place.

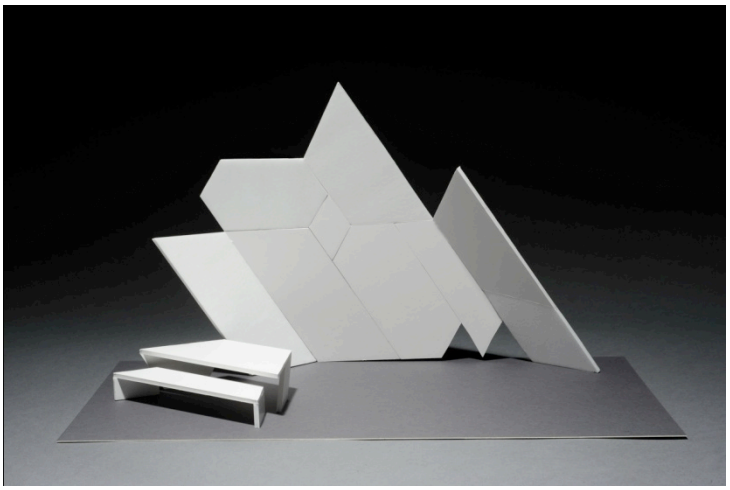


Figure 3.8. Front view of prototype A3

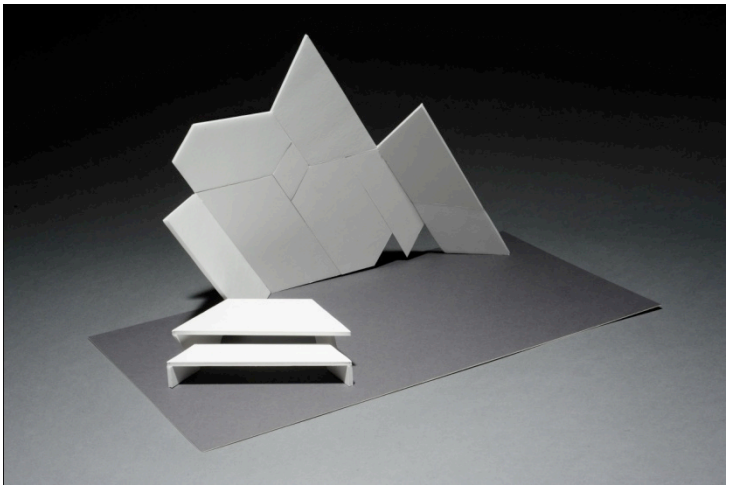


Figure 3.9. Three quarter view of prototype A3

This exhibit is constructed to fit a regular 10X20 foot inline booth space (Figure 3.10). The wall display and the tabletop counters are positioned such that visitors and passersby to not interfere with the traffic. The tabletop counter mimics a peninsula type

display that can be accessed by the visitors from all three sides. It provides potential for the host to change the position as per the traffic flow.

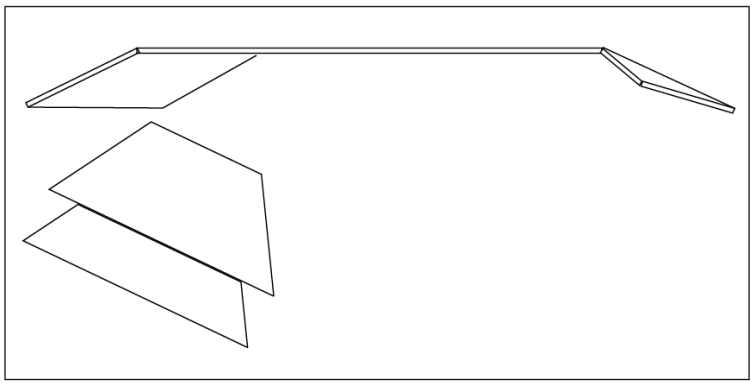


Figure 3.10. Plan view drawing of prototype A3

3.4.4 Prototype A4

Table 3.7. KIT A components used in Prototype A4

Components Used in A4	Quantity Used (nos.)
RC12	2
RH22	2
TZ24	1
TZ26	1
TZ28	2
TZ48	1
PL48	2
IH26	1
	Total 12

Prototype A4 utilizes twelve components to construct an exhibit that can work well in any ten by ten foot booth configuration (Table 3.7). Three sides of the exhibit consist of vertical structures and the fourth side provides two level tabletop counters. This layout of the exhibit can be used to compartmentalize the information in all the different sections it

creates, due to the structural configuration of the components. This allows the visitors to identify clear sections of information and move throughout the exhibit in case its use in an island type space. Adjusting the placement of this exhibit makes it flexible to use in other booth configurations (Figure 3.11).

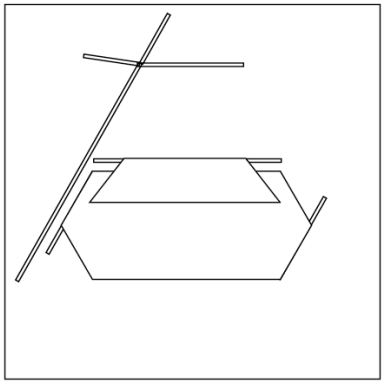


Figure 3.11. Plan view drawing of prototype A4

The top level of the counter is slanted at an ideal reading angle for information display. The angle provides convenience in reading to visitors who are standing or are seated (wheelchair users). The second lower level of the tabletop can be used for displaying product and other displays. The tabletop counter acts as the main section of the exhibit, which is slightly secluded from the other three sides, while the other three sides can utilize the vertical space of the structure for information or graphic display (Figures 3.12 and 3.13).

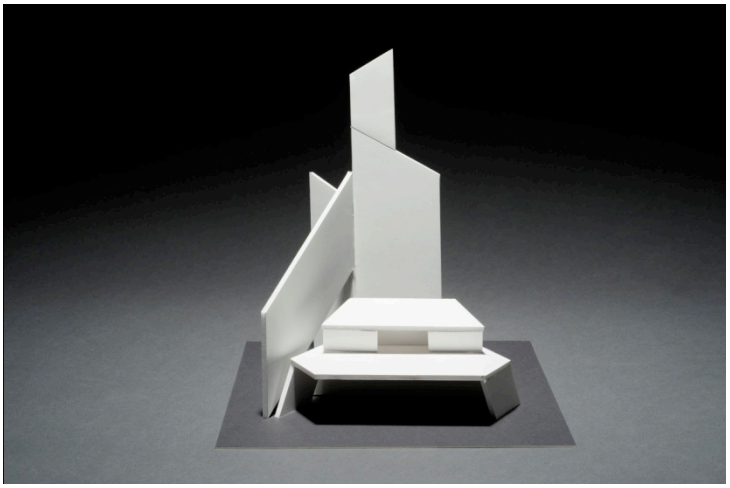


Figure 3.12. Front view of prototype A4

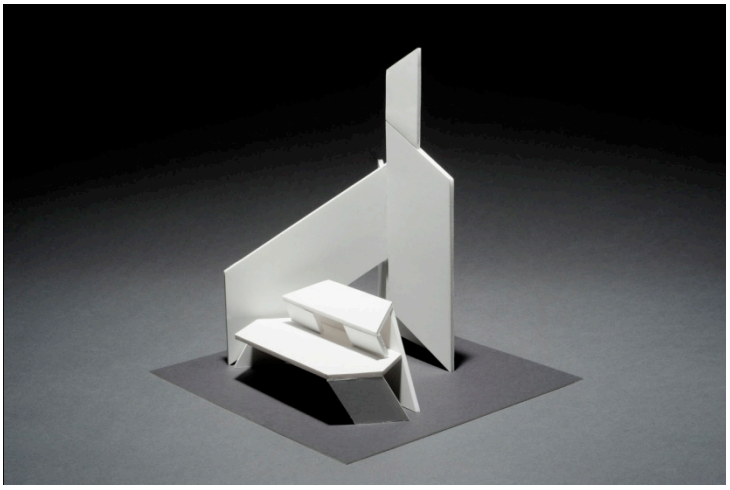


Figure 3.13. Three quarter view of prototype A4

3.4.5 Prototype A5

Prototype A5 is constructed from fourteen of the sixteen components of Kit A (Table 3.8).

Table 3.8. KIT A components used in Prototype A5

Components Used in A5	Quantity Used (nos.)
RC12	2
RH22	2
RH44	1
TZ24	1
TZ26	1
TZ28	1
TZ48	3
PL48	2
IH24	1
	Total 14

It demonstrates an exhibit intended to work in a corner booth configuration. The one corner that is not accessible is utilized to place the main panel of the exhibit. This exhibit functions as an extended table, with provision for a two-level display on one side of the tabletop counter while the rest continues as a single platform. This tabletop structure provides provision for display as well as attendant-visitor interaction (Figure 3.14).

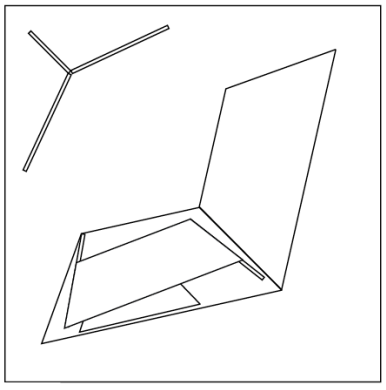


Figure 3.14. Plan view drawing of prototype A5

The tabletop structure contours the entrance peripherals of the booth. This layout provides a secluded area for the attendants/hosts to stand, behind the counters in the center of the booth space. This space could easily be converted into an area to have important visitors. As per the traffic to the booth, the table structure could be moved closer to the main panel, which will reduce the space for the attendants but provide more visitors viewing space (Figures 3.15 and 3.16).

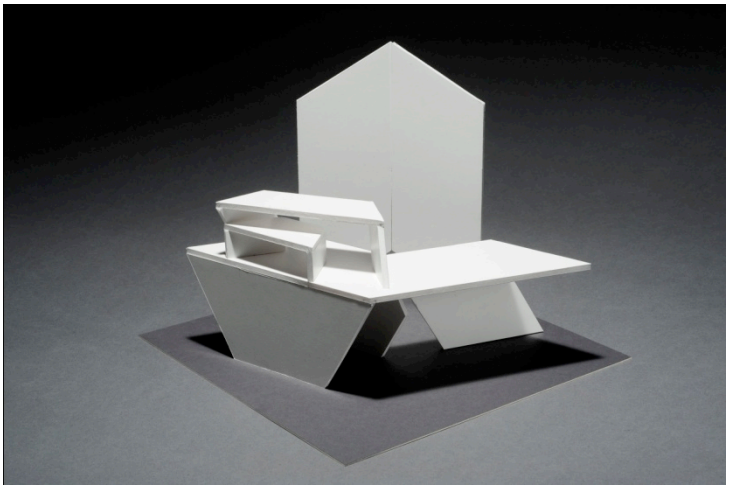


Figure 3.15. Front view of prototype A5

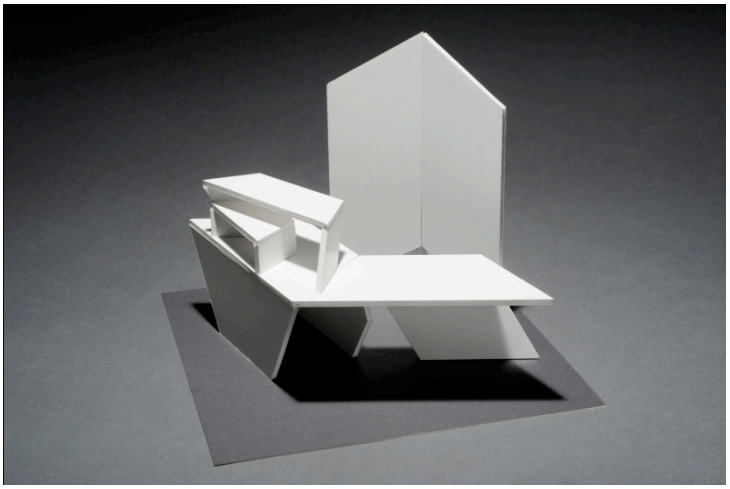


Figure 3.16. Three quarter view of prototype A5

3.4.6 Prototype A6

Table 3.9. KIT A components used in Prototype A6

Components Used in A6	Quantity Used (nos.)
RH22	2
RH44	1
TZ24	1
TZ26	1
TZ28	1
TZ48	3
IH24	1
	Total 10

Ten of the sixteen components are used in prototype A6 (Table 3.9). This compact exhibit structure sports three different tabletop counters and a back panel. Each counter has a different reach, so the exhibitors can display products or three-dimensional displays as per their need to be accessed and showcased (Figures 3.17 and 3.18).

Figure 3.17. Front view of prototype A6

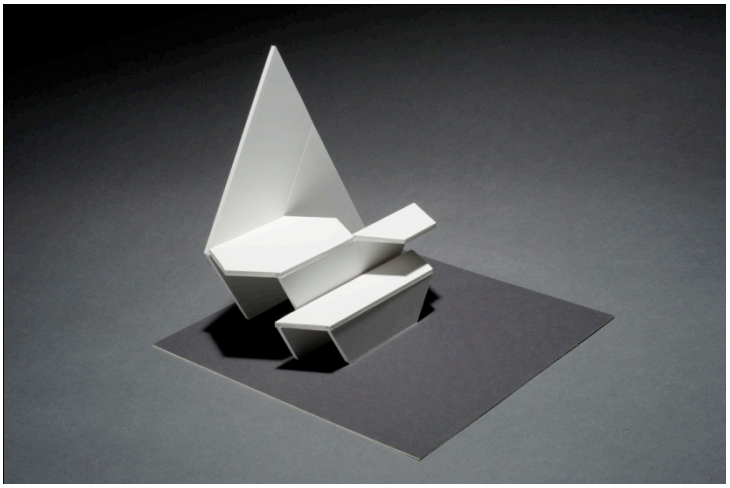


Figure 3.18. Three quarter view of prototype A6

The layout ten by ten feet exhibit is compact and fits well in an inline booth configuration. It provides ample space for the visitors to approach and view the exhibit during heavy traffic, or the space could be utilized for temporary seating.It also provides a small nook between the counters, which could accommodate and provide easy access by the attendant to any of the three counters, or could double as a space for the attendant to stand. (Figure 3.19).

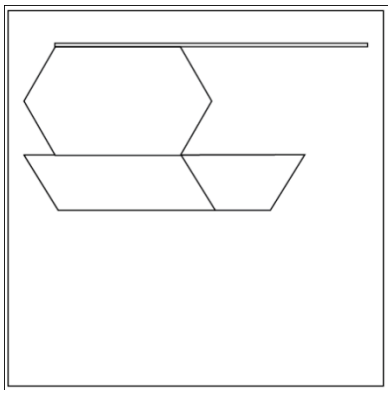
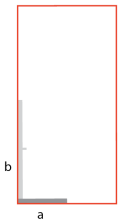
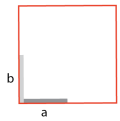


Figure 3.19. Plan view drawing of prototype A6

3.5 KIT B

A total of eighteen components are used in this set. This set exclusively makes use of squares and rectangle shaped components only (Table3.10).

Table 3.10. KIT B Components (18 pieces)

SHAPE	COMPONENTS	QUANTITY (pieces)
RECTANGLE 	RC12 RC24 RC36 RC48	2 3 3 3
SQUARE 	SQ22 SQ33 SQ44	2 2 3

All components of KIT B are at least used four times. Six of the eighteen components are reused in at least four prototypes, while the other twelve components are reused in at least three prototypes. This kit again meets the objective to reuse all the components for a minimum of three prototypes (Table 3.11).

Table 3.11. Matrix to compare the component reuses in different KIT B Prototypes

COMPONENTS	RC12 (X 2)	RC24 (X 3)	RC36 (X 3)	RC48 (X 3)	SQ22 (X2)	SQ33 (X2)	SQ44 (X 3)	TOTAL
PROTOTYPES								
B1	0	2	2	3	2	1	1	11
B2	2	2	1	3	0	1	3	12
B3	2	3	3	2	2	2	1	15
B4	2	3	3	3	0	2	3	16
B5	0	3	2	2	2	2	3	14
B6	2	3	3	1	0	1	3	13

Components used in minimum four prototypes
Components used in minimum three prototypes

3.5.1 Prototype B1

Table 3.12. KIT B components used in Prototype B1

Components Used in B1	Quantity Used (nos.)
RC24	2
RC36	2
RC48	3
SQ22	2
SQ33	1
SQ44	1
	Total 11

Prototype B1 is constructed from eleven of the eighteen components of Kit B (Table 3.12). The corner booth configuration best utilizes the exhibit space by allowing the visitors in from the front corner and its adjacent sides, but it can work well in a regular inline booth space as well (Figure 3.20).

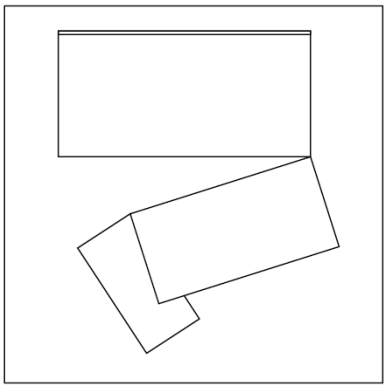


Figure 3.20 Plan view drawing of prototype B1

It consists of different levels of tabletop counter display area. The tabletops- though simple- are arranged in an ascending manner; this helps creates an interesting exhibit. These provide the exhibitor with places to display products of varied heights as per their required reach and visibility. There is no specific space allotted for the attendant/host of the exhibit. Since the tabletop counter displays utilize the entire space it could be possible that the attendant is moving around as per visitor traffic (Figures 3.21 and 3.22).

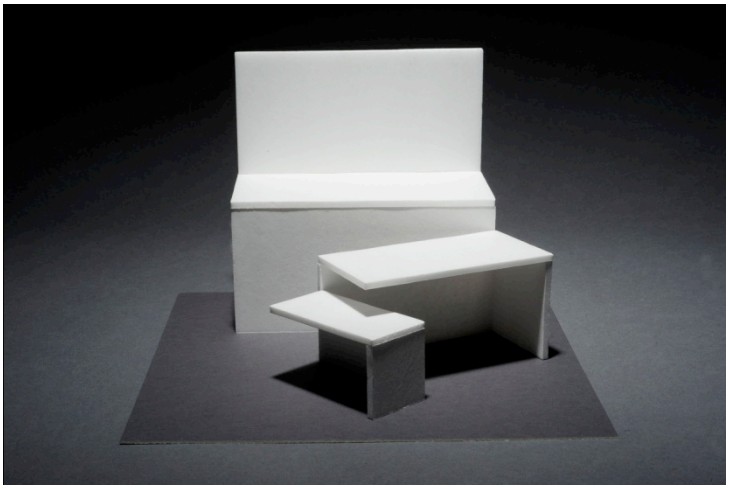


Figure 3.21. Front view of prototype B1

Figure 3.22. Three quarter view of prototype B1

3.4.2 Prototype B2

Table 3.13. KIT B components used in Prototype B2

Components Used in B2	Quantity Used (nos.)
RC12	2
RC24	2
RC36	1
RC48	3
SQ33	1
SQ44	3
	Total 12

Prototype B2 exhibit is constructed from ten modular components from the eighteen in Kit B (Table 3.13). It is designed such that it can work as an island exhibit or a peninsula exhibit in a ten by ten feet space (Figure 3.23).

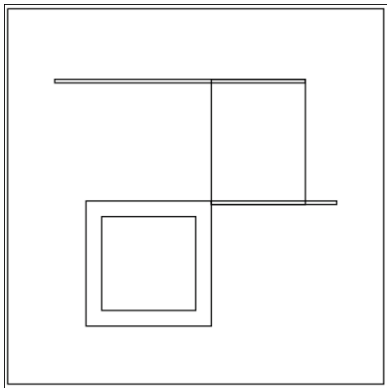


Figure 3.23. Plan view drawing of prototype B2

Functionally it provides for both tabletop counter display area, with its two-levels as well as wall-mounted display area. The exhibit showcases an enclosed interactive section where the visitors can walk through and experience a difference in visual display. The entire length of the vertical structures can be utilized for graphic and information graphics. The tabletop counters can be used to display products, givealways or to demonstrate other displays. The overall layout of the exhibit is open, and provides both attendants and visitors ample space to move through the booth (Figures 3.24 and 3.25).

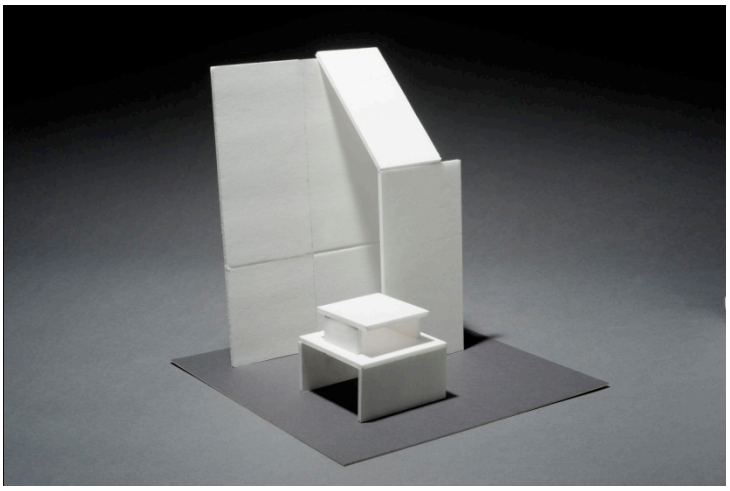


Figure 3.24. Three quarter view of prototype B2

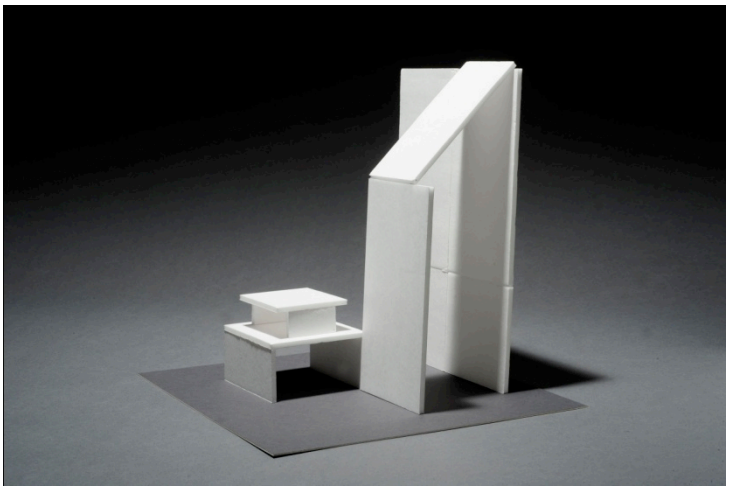


Figure 3.25. A different three quarter view of prototype B2

3.5.3 Prototype B3

Table 3.14. KIT B components used in Prototype B3

Components Used in B3	Quantity Used (nos.)
RC12	2
RC24	3
RC36	3
RC48	2
SQ22	2
SQ33	2
SQ44	1
	Total 15

Fifteen of the eighteen components are reused in the construction of prototype B3 (Table 3.14). This exhibit is created to fit a 10X10 foot booth space with regular inline, peninsula or island type of configurations. The structure occupies the entire length of the

exhibit and is portioned into multiple sections. Each panel of the exhibit front or back can be utilized for some form of display or other (Figure 3.26).

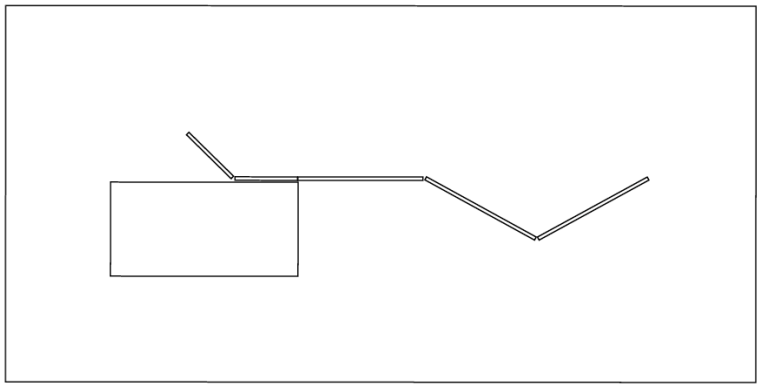


Figure 3.26. Plan view drawing of prototype B3

This exhibit structure relies heavily on different height components to create visual interest. Both tabletop counter and wall-mounted display areas are present in the exhibit. The layout of the exhibit allows the visitors to see through some sections and have some sections more enclosed (Figures 3.27, 3.28 and 3.29).

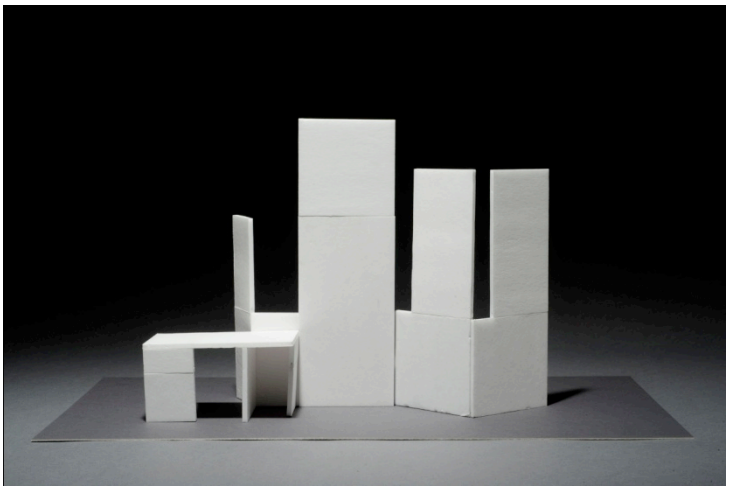


Figure 3.27. Front view of prototype B3

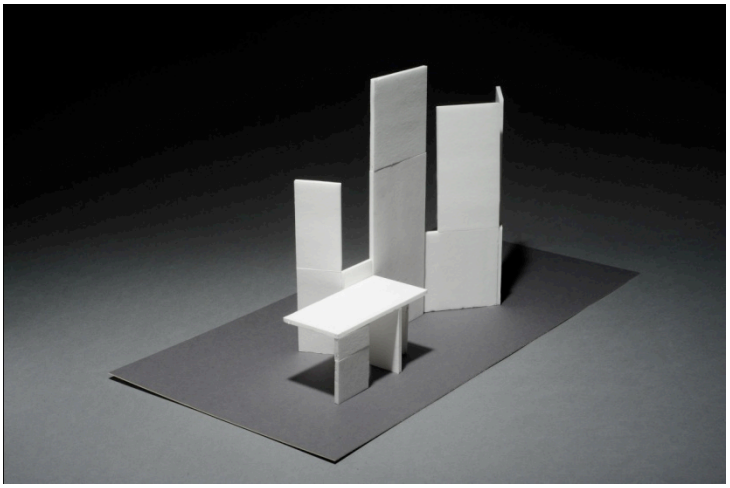


Figure 3.28. Three quarter view of prototype B3

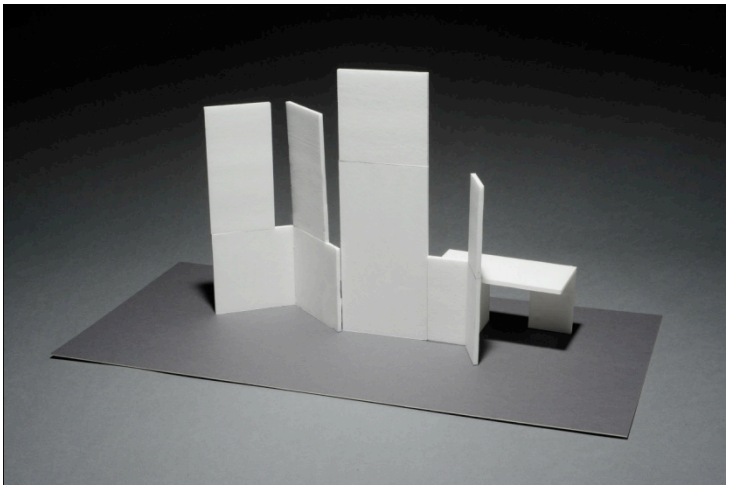


Figure 3.29. Back view of prototype B3

3.5.4 Prototype B4

Prototype B4 utilizes sixteen components from the eighteen in Kit B (Table3.15). These components are configured to fit into a ten by ten foot space.

Table 3.15. KIT B components used in Prototype B4

Components Used in B4	Quantity Used (nos.)
RC12	2
RC24	3
RC36	3
RC48	3
SQ33	2
SQ44	3
	Total 16

The design best fits into a corner exhibit, and allows the visitors to experience the exhibit from the front and its adjacent sides. The exhibit is constructed to form an enclosed structure that is hidden from the heavy crowds usually found in tradeshow (Figure 3.30).

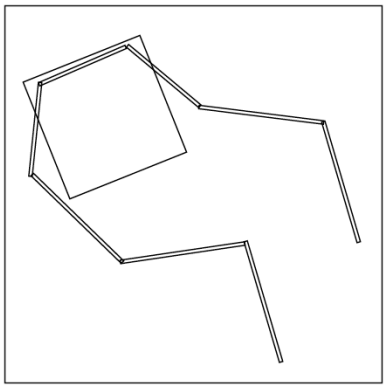


Figure 3.30. Plan view drawing of prototype B4

The exhibit accommodates aspects of experience design, allowing the viewers to sense seclusion and change in environment. The exhibit creates a zigzag walkthrough to reach a tabletop counter display area that is completely hidden. This would be most efficient for an exhibit where personal privacy was desired- visitors weighing themselves, having eye exams etc. All the enclosures provide the exhibit with ample exterior wall space. Since this is

a corner exhibit the exterior of this structure can be utilized for wall-mounted graphics or information displays (Figures 3.31, 3.32 and 3.33).

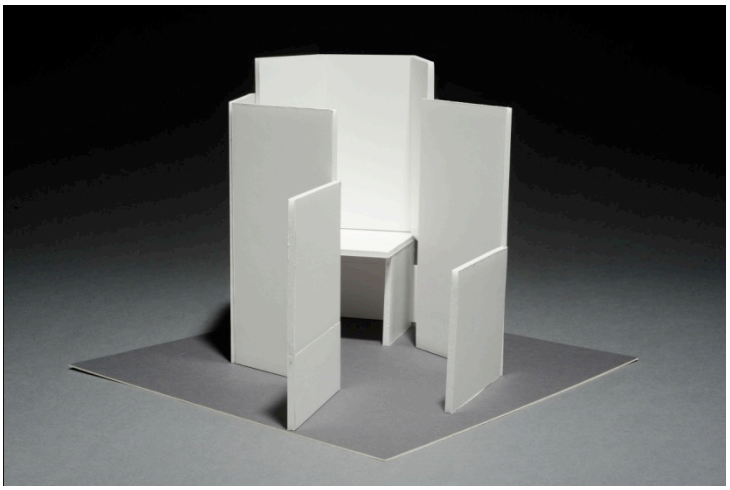


Figure 3.31. Front view of prototype B4

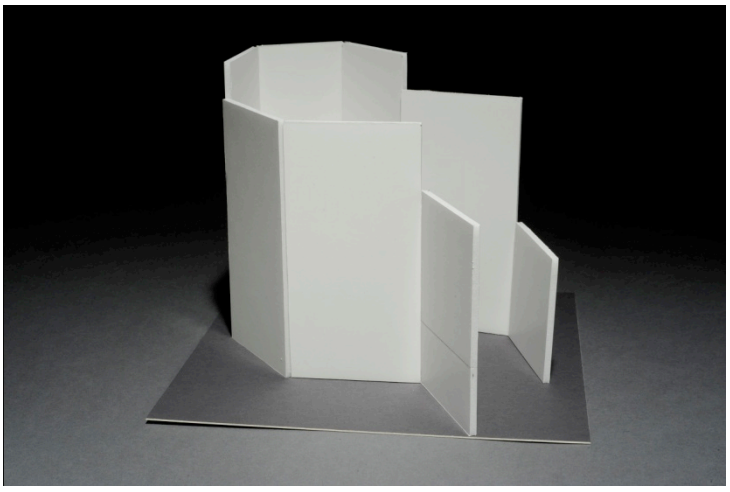


Figure 3.32. Three quarter view of prototype B4

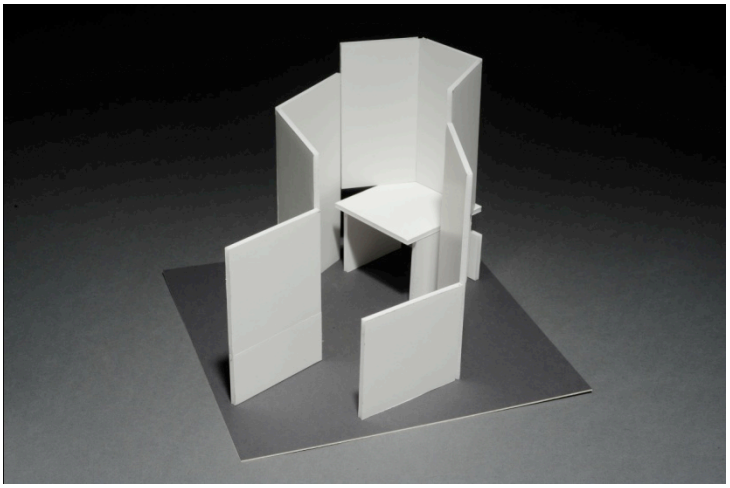


Figure 3.33. A different three-quarter view of prototype B4

3.5.5 Prototype B5

Table 3.16. KIT B components used in Prototype B5

Components Used in B5	Quantity Used (nos.)
RC24	3
RC36	2
RC48	2
SQ22	2
SQ33	2
SQ44	3
	Total 14

Prototype B5 demonstrates a corner booth exhibit made from fourteen components (Table 3.16). It is essentially a combination of different levels of tabletop counter displays and some space to accommodate wall-mounted information. Visitors can enter the exhibit from the front corner and its adjacent sides (Figure 3.34).

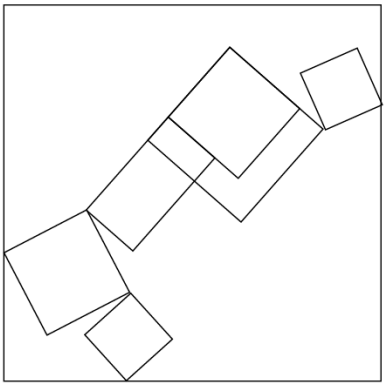


Figure 3.34. Plan view drawing of prototype B5

The counters of the exhibit are at different heights. This could be used to display different products ranging in size and importance. The exhibit tabletop counters are structurally placed such that the products can be viewed constantly and act as visual display items. Another advantage of the different heights is that they allow standing and wheelchair to view the products similarly (Figures 3.35 and 3.36).

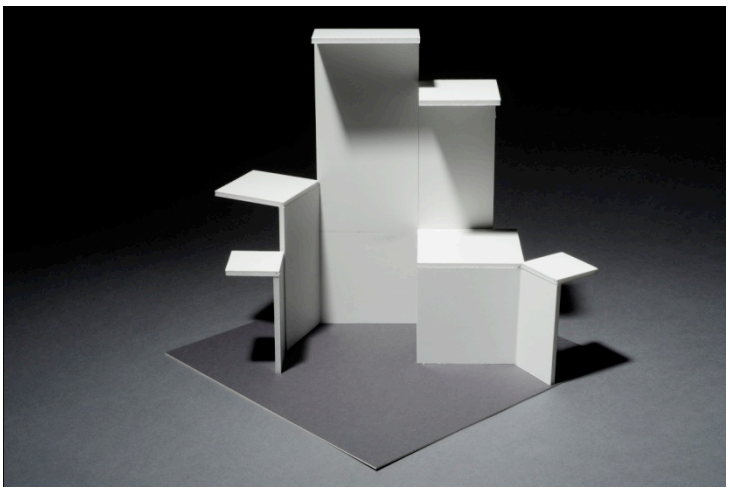


Figure 3.35. Front view of prototype B5

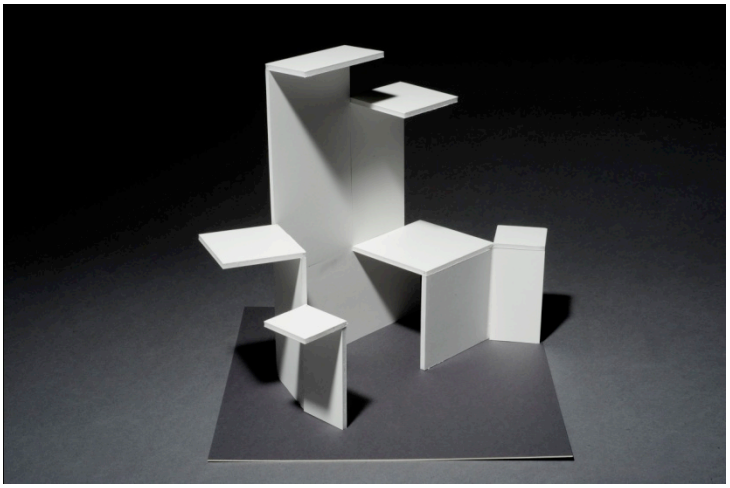


Figure 3.36. Three quarter view of prototype B5

3.5.6 Prototype B6

Table 3.17. KIT B components used in Prototype B6

Components Used in B6	Quantity Used (nos.)
RC12	2
RC24	2
RC36	3
RC48	2
SQ33	2
SQ44	2
	Total 15

Fifteen of the eighteen components are reused in the construction of prototype B6 (Table 3.17). This exhibit is created to fit a 10X10 foot booth space a regular inline configurations (Figure 3.37).

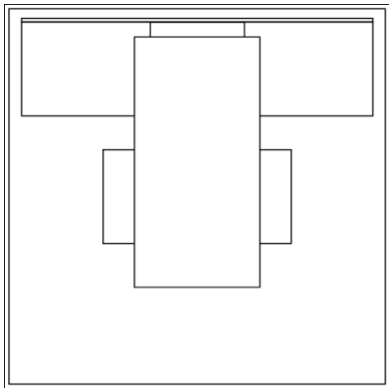


Figure 3.37. Plan view drawing of prototype B6

The exhibit is a diamond shaped structure with a long tabletop utilizing the width of the exhibit. It divides the booth into two sections right at the center. This is the main display area of the exhibit that can showcase three-dimensional products. A secondary tabletop is placed below, and can be used to display products of varying heights. Both the tabletop structures are not fixed and can be are arranged without disturbing the main structure of the exhibit (Figures 3.38 and 3.39).

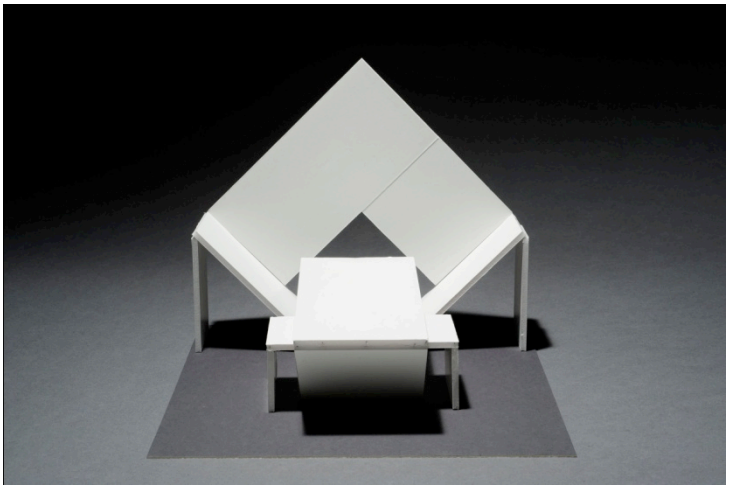


Figure 3.38. Front view of prototype B6

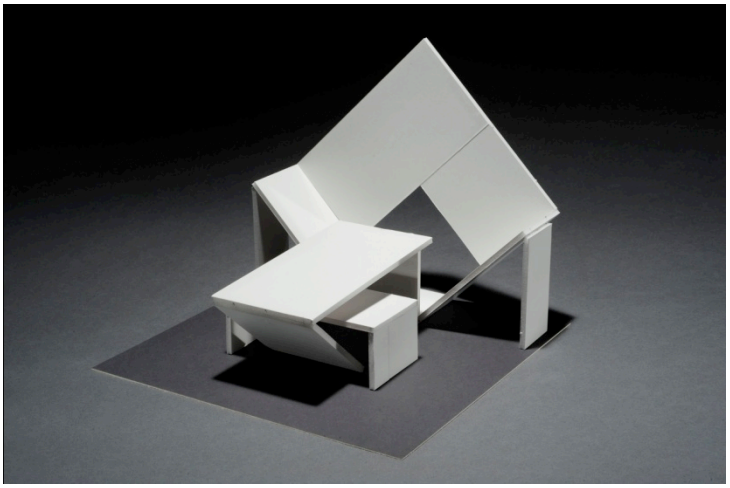


Figure 3.39. Three quarter view of prototype B6

3.6 KIT C

A total of twenty components are used in this set. This set uses a wise variety component shapesranging fromirregular pentagons, parallelograms and hexagons. Other component shapes include square, rhombus, trapezoid and triangle (Table 3.18).

Table 3.18. KIT C Components (20 pieces)

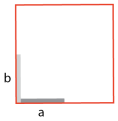
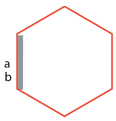
SHAPE	COMPONENTS	QUANTITY (pieces)
SQUARE 	SQ33	1
HEXAGON 	HX22 HX33	2 2

Table 3.18 (Continued)

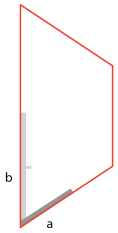
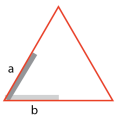
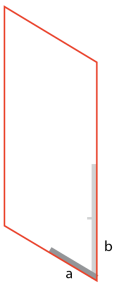
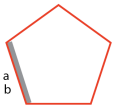
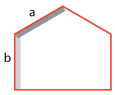
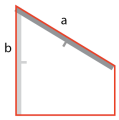
TRAPA**Z**OID 	TZ24	1
TRIANGLE 	TR33	1
PARA**L**LELOGRAM 	PL36	3
PEN**T**AGON 	PT33	2
IRREGULAR **P**ENTAGON 	IP12 IP14 IP28	2 3 2

Table 3.18 (Continued)

QUADRILATERAL 	QL48	1

All components of KIT C are at least used four times. Twelve of the eighteen components are reused in at least four prototypes, while the other eight components are reused in at least three prototypes. This kit again meets the objective to reuse all the components for a minimum of three prototypes (Table 3.19).

Table 3.19. Matrix to compare the component reuses in different KIT C Prototypes

COMPONENTS	**SQ33** (X 1)	**HX22** (X 2)	**HX33** (X 2)	**TZ24** (X 1)	**TR33** (X 1)	**PL36** (X 3)	**PT33** (X 2)	**IP12** (X 2)	**IP14** (X 3)	**IP28** (X 2)	**QL48** (X 1)	**TOTAL**
PROTOTYPES												
C1	1	1	1	0	1	3	0	2	3	1	1	14
C2	1	2	2	1	0	2	2	2	3	2	1	18
C3	0	2	2	1	1	3	2	2	0	0	0	13
C4	0	0	0	1	1	2	2	2	2	2	1	13
C5	1	2	2	1	1	3	1	2	3	1	0	17
C6	1	0	0	1	0	3	0	2	3	2	1	13

Components used in minimum four prototypes
Components used in minimum three prototypes

3.6.1 Prototype C1

Prototype C1 constitutes of fourteen of the twenty components of kit C (Table 3.20).

Table 3.20. KIT C components used in Prototype C1

COMPONENTS	QUANTITY (pieces)
SQ33	1
HX22	1
HX33	1
TR33	1
PL36	3
IP12	2
IP14	3
IP28	1
QL48	1
	Total 14

The exhibit design best fits a 10X10 foot, corner booth configuration. The layout allows the visitors to walk in through adjacent sides into the booth and reach up to a tabletop counter, which is arranged at the booth contours (Figures 3.40, 3.41 and 3.42).

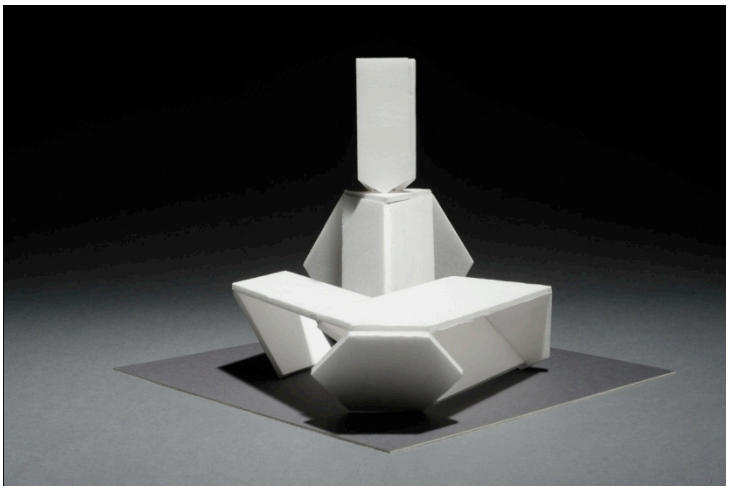


Figure 3.40. Front view of prototype C1

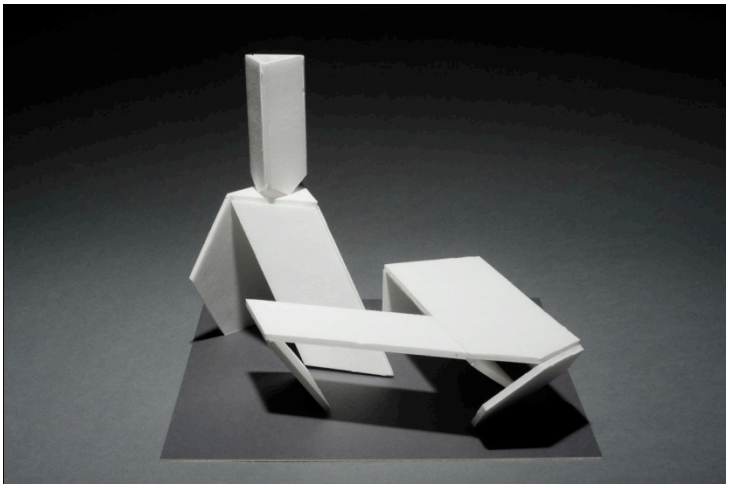


Figure 3.41. Three quarter view of prototype C1

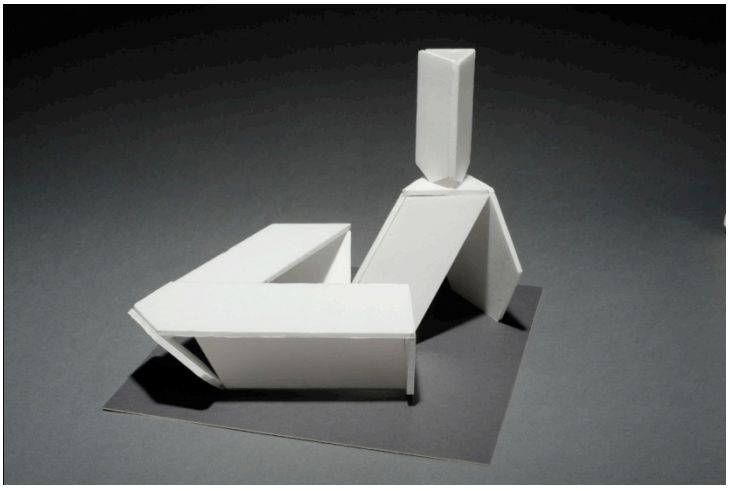


Figure 3.42. A different three quarter view of prototype C1

Functionally, it serves as a tabletop counter display with interesting structures for visual appeal. The design provides space for attendants/hosts between the tabletop counters and the main exhibit structure. This space can be moved closer or farther away from the main structure to accommodate desired space as per the requirement of the attendants or the traffic the booth encounters (Figure 3.43). The tabletop counters can be used to display three-dimensional products or other displays.

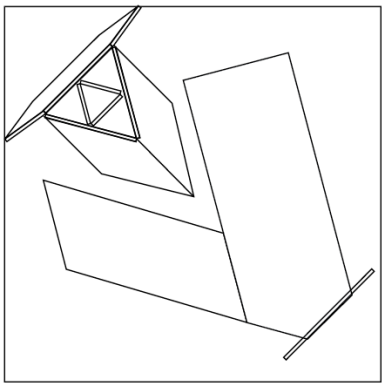


Figure 3.43. Plan view drawing of prototype C1

3.6.2 Prototype C2

Table 3.21. KIT C components used in Prototype C2

COMPONENTS	QUANTITY (pieces)
SQ33	1
HX22	2
HX33	2
TZ24	1
PL36	2
PT33	2
IP12	2
IP14	3
IP28	2
QL48	1
	Total 18

Prototype C2 uses eighteen of the twenty components from Kit C (Table 3.21). The exhibits consists mostly hexagon and pentagon components in a 10X20 foot booth space in a regular inline configuration. The exhibit combines the components to form a cell type back panel. The exhibit also sports a three level table on one side of the exhibit. This design allows ample walking space for visitors (Figure 3.44).

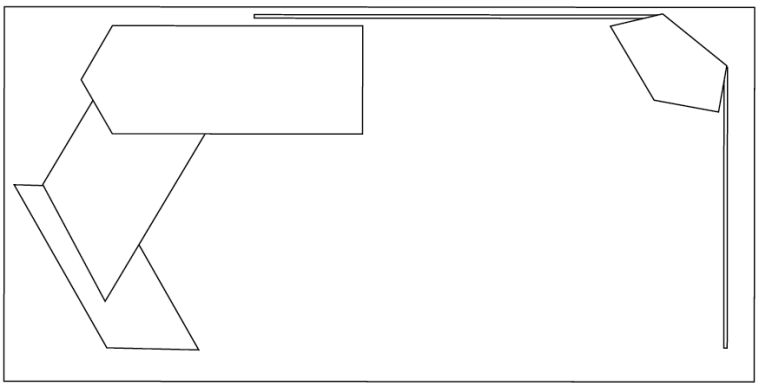


Figure 3.44. Plan view drawing of prototype C2

The back panel can be used for wall- mounted graphic and information display. The three-level table can be used to display of three-dimensional products or display of varied heights, as well as for attendant-visitor interaction. The tables are arranged one below the other and the surface areas can be increased slightly as per the requirement of the tradeshow (Figures 3.45, 3.46 and 3.47).

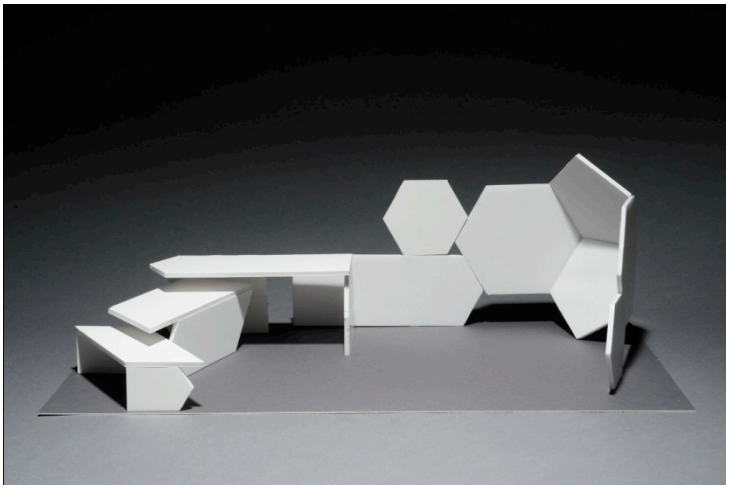


Figure 3.45. Front view of prototype C2

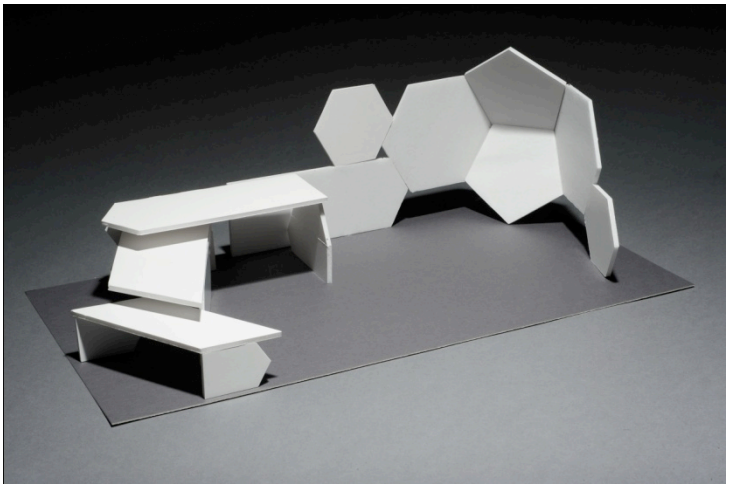


Figure 3.46. Three quarter view of prototype C2

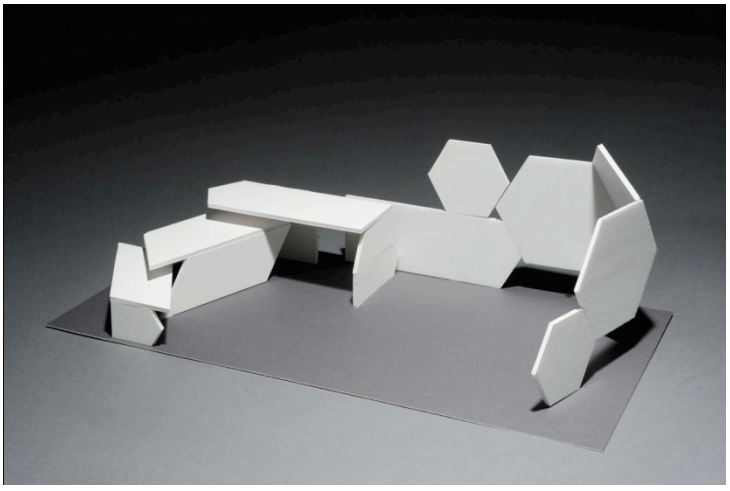


Figure 3.47. A different three quarter view of prototype C2

3.6.3 Prototype C3

Prototype C3 uses thirteen of the twenty components from Kit C (Table 3.22). It mainly consists parallelogram, pentagon and trapezoid shaped components to form a 10X10 foot inline booth space. The exhibit structure consists of pedestals at two levels. The exhibit structure is arranged on one side of the booth, which provides enough space for the visitors to interact with the exhibit and the attendants (Figure 3.48).

Table 3.22. KIT C components used in Prototype C3

COMPONENTS	QUANTITY (pieces)
SQ33	1
HX22	2
HX33	2
TZ24	1
TR33	1
PL36	3
PT33	2
IP12	2
	Total 13

The pedestals structure supports tabletop surface area for the display of three-dimensional products and displays. The pedestals themselves can be for the graphic display or wall-mounted information display. The structure also consists of a tall back panel, which can be used part for graphic display and part for information display (Figures 3.49 and 3.50).

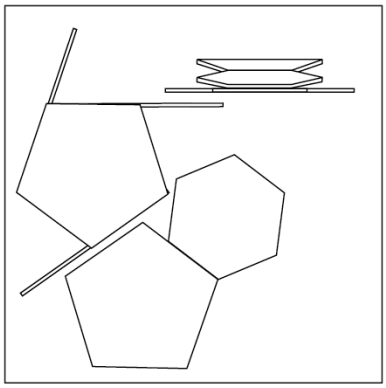


Figure 3.48. Plan view drawing of prototype C3

Figure 3.49. Front view of prototype C3

Figure 3.50. Three quarter view of prototype C3

3.6.4 Prototype C4

Prototype C4 is constructed from thirteen of the twenty components of Kit C (Table 3.23). this exhibit fits in a basic inline configuration of a 10X10 foot booth space. The basic shape of the exhibit structure is designed with branching panel surfaces and do not consists of any tabletop surfaces (Figure 3.51).

Table 3.23. KIT C components used in Prototype C4

COMPONENTS	QUANTITY (pieces)
TZ24	1
TR33	1
PL36	2
PT33	2
IP12	2
IP14	2
IP28	2
QL48	1
	Total 13

The exhibit functions primarily for wall-mounted or information displays. Even though the structures have so many vertical panels, it is partially open so the visitors can see the other side of the exhibit as well. The panels that are not at eyelevel are slanted at a convenient reading angle for easy viewing of standing and seated (wheelchair) visitors (Figures 3.52 and 3.53).

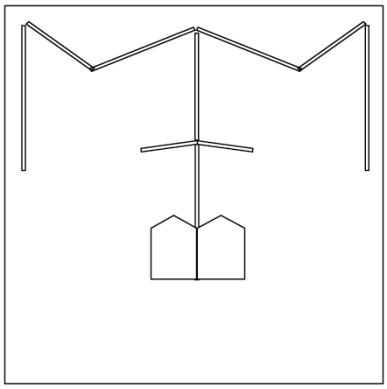


Figure 3.51. Plan view drawing of prototype C4

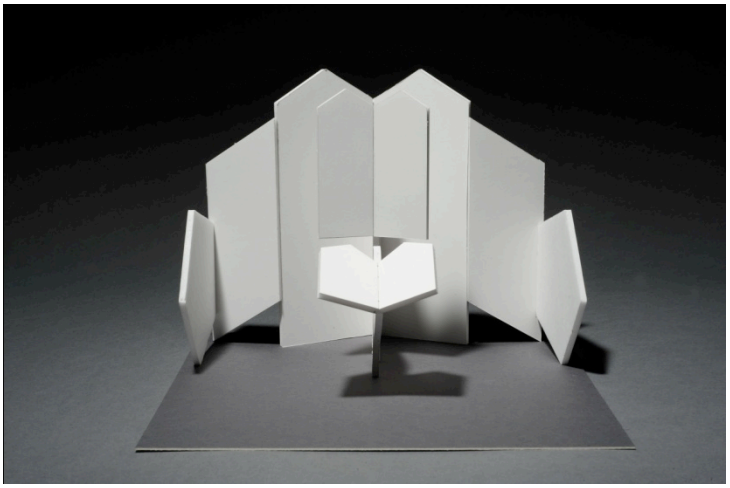


Figure 3.52. Front view of prototype C4

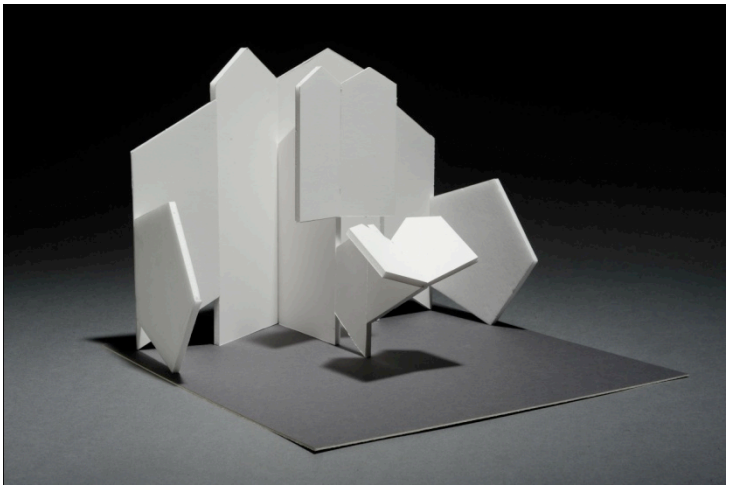


Figure 3.53. Three quarter view of prototype C4

3.6.5 Prototype C5

Prototype C5 uses seventeen of the twenty components from Kit C (Table 3.24). The structure fits in a 10X10 foot, peninsula type booth configuration. The exhibit design consists of three main components a back panel, a slanted pentagonal centerpiece and two-level tabletop on the side. This leaves ample space around the exhibit for viewers to monitor it (Figure 3.54).

Table 3.24. KIT C components used in Prototype C5

COMPONENTS	QUANTITY (pieces)
SQ33	1
HX22	2
HX33	2
TZ24	1
TR33	1
PL36	3
PT33	1
IP12	2
IP14	3
IP28	1
	Total 17

The two-level tabletop structure can be used to showcase three-dimensional products and displays of varied heights without obstructing each other. The slanted centerpiece is at a convenient reading angle for both standing and seated (wheelchair) visitors so that they have similar ease and experience of the exhibit. This centerpiece can be used for information or graphic display and is big enough to accommodate additional interactive displays like rotating wheels, three-dimensional information charts etc. (Figures 3.55 and 3.56)

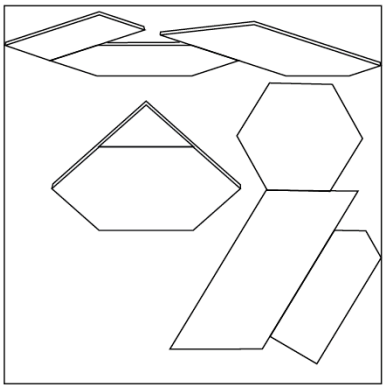


Figure 3.54. Plan view drawing of prototype C5

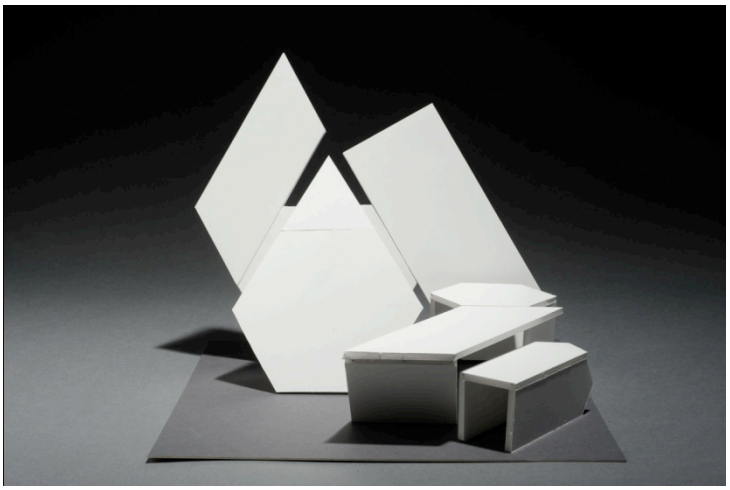


Figure 3.55. Front view of prototype C5

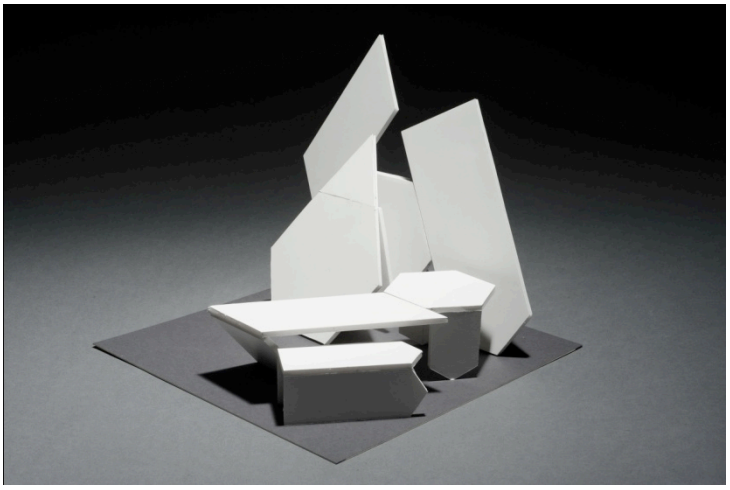


Figure 3.56. Three quarter view of prototype C5

3.6.6 Prototype C6

Prototype C6 utilizes thirteen of the twenty components from Kit C (Table 3.25). These components combine to form an exhibit structure that fits well in a regular inline of a peninsula type booth space configuration. The exhibit primarily is a tabletop structure with

an angular structure as the main back panel. This leaves ample space for the visitors to move around and monitor the exhibit (Figure 3.57).

Table 3.25. KIT C components used in Prototype C6

COMPONENTS	QUANTITY (pieces)
SQ33	1
TZ24	1
PL36	3
IP12	2
IP14	3
IP28	2
QL48	1
	Total 13

The two-level tabletop surface can be utilized for display of three-dimensional products or other displays. Though the small size exhibits generally don't support seating this exhibit provides space that can be for temporary seating depending on the traffic the exhibit encounters (Figures 3.58, 3.59 and 3.60).

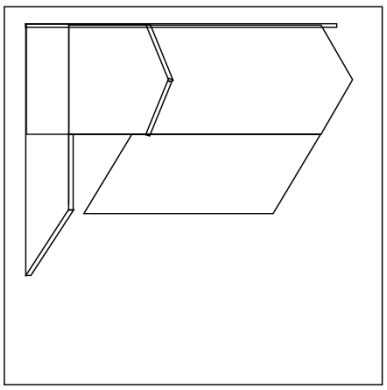


Figure 3.57. Plan view drawing of prototype C6

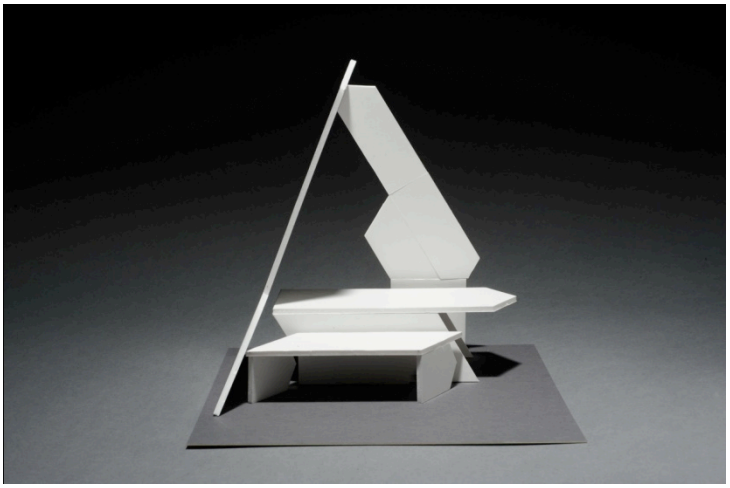


Figure 3.58. Front view of prototype C6

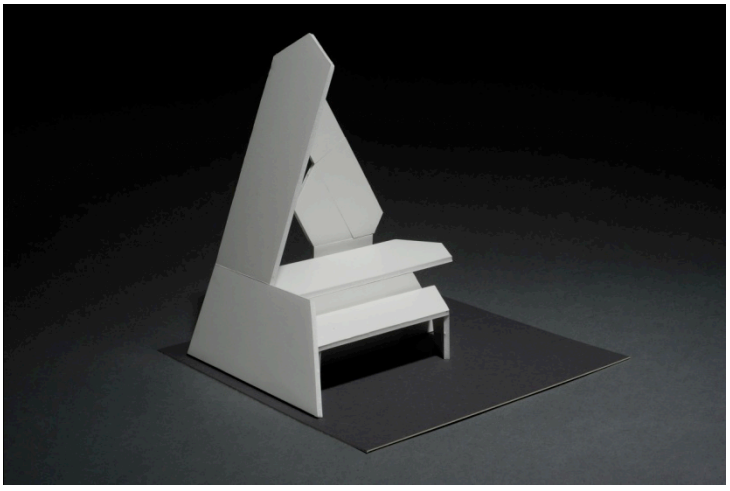


Figure 3.59. Three quarter view of prototype C6

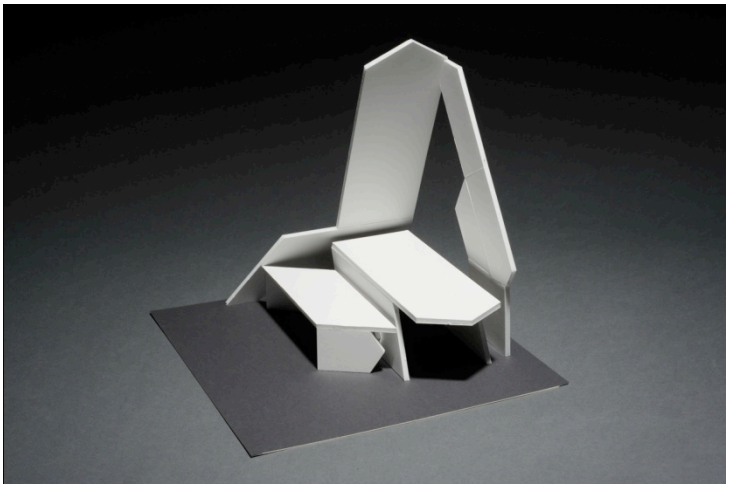


Figure 3.60. A different three quarter view of prototype C6

3.7 Graphic Options

Both structure and graphics are important aspects of exhibit design. While structure creates interest and function, the graphics provide visual interest, brand image, information, and theme to the exhibit. Though the focus of this study is not to provide graphic solutions, without the application of graphics it would not showcase the full potential of the structural variety of any two exhibits in a set. In order to demonstrate this potential, two sample exhibits are applied with graphics.

There are a wide variety of sustainable materials that could be used in application of graphics to the structural surface of the proposed exhibit designs. One method is to paint the exhibit components with desired graphics using water-based inks. But this might not be the best option owing to the logistics, the weather and the wear and tear of the components. Painting would also not get rid of frames and connections required for a seamless integration of the components. Second option would be to use eco-friendly, recycled or recyclable papers, banners or fabric as the substrate to print the graphics with eco-friendly water-based

inks. This material could then be covered, stapled or stuck on the exhibit structure very similar to what a custom exhibits might use to cover itsstructures in graphics. This would also make sure that the frames/connectors used hold the components together would be completely covered.

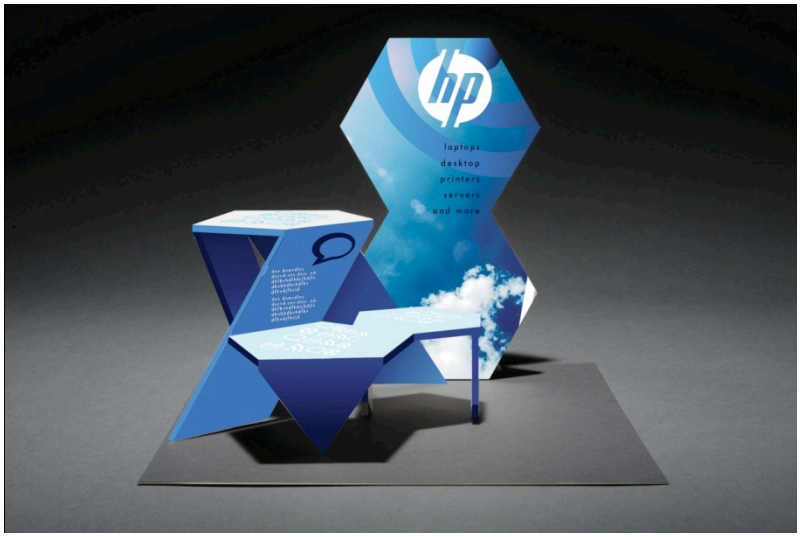


Figure 3.61. Front view of prototype C3 applied with graphics

Figure 3.62. Front view of prototype C5 applied with graphics

The two exhibit examples shown here are from Kit C, C3 and C5 (Figures 3.61 and 3.62). The graphics provide color and theme change and enhance the variety in the exhibit

structures that could be used from year to year. The update in the graphic surface would incur costs for the company using the exhibits, but this would be diminished to a great amount considering that no additional cost is incurred for the use of the panel substrates or the structural materials for the exhibit.

3.8 Non- component features

The “non-component features” are features or objects that are not a part of the KIT of components (not a part of the modular system). Exhibitors often require adding additional displays in an exhibit as per their needs. There might be additional structural objects or displays- important to be the exhibit in terms of information or design and shape- that needs to be accommodated in the exhibit but not eat away any of the display space. The non-component structure or feature is that additional piece that can either be accommodated or substituted with the some components from the Kits.

The capacity to incorporate a non-component feature in any exhibit provides great potential to improve/increase the exhibit’s appeal. This feature is accommodated in the proposed exhibit prototypes. Componentsfrom the exhibits that are not being utilized as supporting structures can be replaced to accommodate a non-component feature.

3.9 Limitations of this Methodology

The methodology proposes building prototypes from a kit of modular components. The methodology compares these prototypes traffic layout, function and structure of the exhibit in the scaled ten feet by ten feet and ten by twenty feet space as well as comparing the utilization of the components in a set. The methodology also proposes probable graphic

options for the model exhibits.

The limitations to this methodology are

- Customers' response to the Kits:

  It is not in the scope of this study to predict the response of the customers to the proposed kits and prototypes.

- Proposing a marketing plan to the customers to teach the advantage of using this system:

  This study focuses on developing this system and exhibit designs that can be created with them. This study does not make attempts in proposing marketing plan to teach the advantages of this system to customers.

- There is no direct comparison made between the resources consumed by the proposed kit and prototypes vs. custom design exhibits:

  The prototypes from this study are created and based on the study of modular exhibit systems and their functions and requirements. The typical custom designed exhibits' resource consumption was not directly compared to the proposed kit and prototypes; hence there is no telling precisely how they compare in a resource evaluation with them.

CHAPTER 4. CONCLUSION

The main aim of this project was to present modular exhibits to their full potential. The purpose of this study was not to test the cost-effective, functional and logistic value of the modular exhibit systems; in fact their significance is already established. In spite of the functional significance of modular exhibit systems, they are often not thought capable of providing interesting exhibit designs. For this reason modular exhibit system are being reinvented from time to time in an attempt to appeal to the changing customer expectations. From an exhibit designer's standpoint it seemed that the problem was not a question of the capability of modular exhibits to produce interesting exhibit designs; it was the lack of showcasing these exhibits in a way that would help the customers to utilize the modular exhibit systems. This paper attempts to study the past and current use and effectiveness of representing the modular exhibit design systems. Currently, modular exhibit systems have taken a turn towards customization in attempts to reinvent themselves. They focus on the design aspects, and make use of modularity only for its functional significance and not for the variety it can produce. The reconfiguration aspects are under-utilized, almost forgotten. The prototyping process for this study was not only an attempt to see how modular components could be utilized to construct new, interesting and significantly different exhibit designs, but also to present a way of showcasing how one kit of modular components could yield multiple various designs such that the customers could understand and utilize the modular kit of components they invest in to its complete potential.

Another aspect of reinventing modular exhibit systems in the current tradeshow industry is to produce green exhibit systems. Literature revealed that the green exhibit

systems (both custom and modular) are adopting the use of sustainable and recyclable materials, engineering technology, exercise modularity- limited to the reuse or reconfiguration of parts of an exhibit to fit new spaces without any real change in the design, and finally recycling of materials as their key features to attain sustainability. It also revealed that in spite of the exercising modular aspects the exhibit system was used only two to three times before the companies invest in another modular exhibit system. To the author's understanding, modularity was not being exercised to its full potential as a key sustainable feature. Hence if the attempts of the prototyping process are successful, this study would also make an attempt to present modularity as a tool to extend the lifecycle of the modular exhibit system, thus proposing modularity as a key feature towards sustainability.

The main approach these prototypes followed, unlike the current modular exhibit systems (both green and regular versions), was to distinguish the structural and graphical capabilities and address them separately. The prototypes focus on creating interesting structures based on function, type of booth, and traffic. Since modular exhibit systems (both green and regular versions) are currently only used for two to three uses with slight changes to the existing design, the prototypes for this study is an attempt to produce completely different structural exhibits.

Three different kits of modular components are formed, each of which was able to produce six significantly different designs. The exhibit prototypes from each kit produced a mix of island and peninsula type configurations for both 10X10 feet or 20X20 feet booth space. Functionally, they portray both wall or tabletop counter display or a combination of both. This allows the customers to select a modular system that works as per their tradeshow needs. The current modular exhibit systems showcase one major exhibit design, and provide

options of reconfiguration only in terms of resizing into different booth spaces. Essentially the structures and graphics look similar, and are used only two to three times before moving to a new modular exhibit. The prototype process tested the hypothesis that one kit of modular components can produce a significant variety of exhibit designs which are structurally interesting, and which can be showcased in a simple manner for the customers to understand. Each kit is showcased with the diagrams of the components it consists of, and further each prototype is showcased along with diagrams of the components used and photos of the particular prototype itself.

Many graphic options could have been designed for the purpose to show that the surface details could be changed. But based on the scale and purposes of this study only two prototypes from Kit C are digitally designed with graphics to portray how different exhibits could look from year to year or tradeshow to tradeshow. The structural costs invested initially for the modular kit components get distributed over the number of uses.

The prototypes for this study are able to clearly portray the exhibits constructed, as well as the components being used. They also demonstrate variability in the exhibits per kit of components, and amplify the sustainability features of modular exhibits by tapping full potential of the modularity aspects. These parameters are designed for customizable exhibits. This study furnishes exhibitors to select and choose from the available prototypes and also gives a opportunity to 'customize' it to suit their own needs.

4.1 Implications for the Future

Given the scope of this study there remains a huge potential for the modular exhibit systems to be researched further. This study focused on the interesting structural design of the exhibit prototypes. Given the author's experience with the entire process of prototyping, there lies tremendous opportunity to increase the number of exhibits that can be constructed from each kit. Future research might look at undertaking this more extensive prototyping process, possibly creating different kits and constructing additional interesting exhibits. This study tried to fill gaps that modular exhibit manufacturers have in their communication to their customers. Their participation would be essential if this study was to be utilized commercially. Further implications in the direction of research and industrial use would be to tackle the limitations of this study. Which would be to study the customers' response to the Kits, proposing a marketing plan to the customers to teach the advantage of using this system, compare the resources consumed by the proposed kit and prototypes versus the custom design exhibits.

This study utilized the components from the Lacet Panel System that was very popular due to its unique and functional features. For future research the methodology adopted in this paper can extend itself to other existing modular systems or new modular systems can be created which can encompass the latest material and technological advances and inventions of the day.

Another future implication for this study would be to utilize three-dimensional softwares and online platforms to create an interface that could involve the exhibitors themselves in the process of creating and establishing an easier, interactive showcasing of the

proposed kits. Online interfaces such as sketch-up could be devised where the exhibitors could easily select prototypes and “paste” colors and graphics as per their specifications into one of the prototype exhibits to see how it would look.

Though this study is concerned with modular tradeshow exhibits, the application of this study can extend itself to other fields of design. Store exhibits/ visual merchandising, museum exhibits and interior design are all fields that realize the need for sustainable designs while at the same time needing to revamp as times change. Modularity as documented in this study is an aspect that shows the capability to produce interesting designs, and pursues sustainability by reusing the modular parts.

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